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BUDGET HEARING ON FY 1997 REQUEST FOR
DOE, NOAA, AND EPA'S OFFICE OF RESEARCH
AND DEVELOPMENT (ORD); AND SAFE DRINK-
ING WATER ACT R&D REAUTHORIZATION

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Budget Hearing of FY 1997 Request f...

HEARING
BEFORE THE
SUBCOMMITTEE ON ENERGY AND ENVIRONMENT
OF THE
COMMITTEE ON SCIENCE
U.S. HOUSE OF REPRESENTATIVES
ONE HUNDRED FOURTH CONGRESS
SECOND SESSION

MARCH 21, 1996

[No. 76]
Volume I

Printed for the use of the Committee on Science



DEPOSITORY

JUL 30 1997

U.S. HOUSE OF REPRESENTATIVES

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BUDGET HEARING ON FY 1997 REQUEST FOR DOE, NOAA AND EPA'S OFFICE OF RE- SEARCH AND DEVELOPMENT [ORD]; AND SAFE DRINKING WATER ACT R&D REAU- THORIZATION

THURSDAY, MARCH 21, 1996

U.S. HOUSE OF REPRESENTATIVES
COMMITTEE ON SCIENCE,
SUBCOMMITTEE ON ENERGY AND ENVIRONMENT,
Washington, DC.

The Subcommittee met at 9:30 a.m. in room 2318 of the Rayburn House Office Building, the Honorable Dana Rohrabacher, Chairman of the Subcommittee, presiding.

Mr. ROHRABACHER. The Subcommittee will come to order.

Today we will cover the budget reauthorizations of the agencies under this Subcommittee's jurisdiction: EPA, the Department of Energy, and NOAA.

We will also take testimony on the reauthorization of the Safe Drinking Water Act.

This hearing is making up for lost time, so we have a lot of ground to cover. I apologize to my members that we are behind schedule and that is why we are trying to do things as quickly as possible.

I just mentioned to Mr. Roemer, our Ranking Member, that if indeed this hearing does not cover specific areas that members of this Committee would like to discuss, and they think that more oversight is needed in certain parts of the budget, this Chairman is totally open to a request for a specific hearing into a specific area, or to include a specific area of the budget onto another hearing that we would have.

So if you feel that there is something that you would like to get on the record and would like to look at and probe a little bit more and that we are not doing at this hearing, just approach the Chairman or the staff and we will try to reach an accommodation on that. That is a perfectly reasonable request.

The Clinton Administration budget for Fiscal Year 1997 was delivered to Congress six weeks late. I understand that they are still working on the numbers, I guess, is what you say, for part of the Department of Energy's budget. So we are all a little bit behind schedule here.

That explains why we will take testimony from all three agencies under this Subcommittee's jurisdiction at one hearing.

We will also examine the research components of the Safe Drinking Water Act which is up for reauthorization this year.

We will first hear from the National Oceanographic—Oceanic, excuse me—I don't know why I want to say "oceanographic," for some reason—and Atmospheric Administration.

NOAA's Fiscal Year 1997 request for \$2,061,000 is up 9 percent from current funding. I have some concerns about this, but let me begin with a positive note.

I just talked with Mr. Baker about this. NOAA has taken heed of Congressional desires to eliminate the anachronistic "NOAA core" and to continue privatization efforts for the fleet; and also the privatization efforts in its specialized weather services.

We will continue to support NOAA's weather privatization proposal even though, as we speak, some pork-minded Senators are trying to sneak these programs into the Farm Bill Conference Report.

Although I would normally be concerned with the large increase requested for the troubled Weather Modernization Program known as AWIPS, I am reassured by the NOAA Administrator's testimony before our Subcommittee this month that he will accept a budget cap of \$525 million for the program, and that they will do the job with the budget that we have agreed upon.

The current request we are looking at, however, does raise some questions.

If we move forward with privatization of the fleet, why is this not reflected in a reduction in the new "civilian" NOAA corps?

There is a seeming disconnect between the Administration's request for large increases in NOAA's satellite budget and the actual state of this particular program which we will ask for some verification and some illumination on this subject.

For example, on March 12th, the announcement of a substantial delay in the Polar Convergence Program seems to have had no impact on the budget request. What is that all about?

I look forward to NOAA's presentation on these issues.

The Department of Energy budget is disappointing to those of us who support preserving funds for energy research while moving toward a balanced budget.

First, the bottom line is deceptive. It is claimed that there is an 8 percent reduction from current funding levels, but that figure is arrived at through—are we showing these figures here?—through a budget gimmick involving future appropriations for the Clean Coal Program.

Take away the gimmicks and you have a 5 percent, or a \$250 million budget increase! By using this smoke-and-mirrors approach to the budget, DOE will be forced to face draconian cuts in the future to meet balanced budget goals. So let's talk about that.

Let me find out, first of all, whether or not these figures are accurate and whether or not my staff was accurate in telling me that, and whether or not we are making an honest attempt at making a phased-in approach to a balanced budget rather than saying we are going to take all the cuts in the outer years, which really means no commitment to a balanced budget at all.

The priorities in this budget request are even more disturbing.

In short, this budget sacrifices science to fund what I consider to be pork. It gives what I consider to be—basically, it gives the lie, and I hate to say it in those harsh terms, to the Administration's claim that they support more money for "energy" research, and I will say, after last year and over and over and over and over again how we are cutting energy research and development, and how this Administration opposed this.

According to the request we have now, that just is not the case.

We have some charts I guess that demonstrate this. These are not my charts. They are charts that were supplied by the Department of Energy.

If you will look at the first chart, you will see a major increase for energy efficiency and renewable energy, with most of the increase going—going to what? What is it going for? It is going for, not research and development, it is going for "market promotion programs."

Now it did not say "research and development"—or it would have said research and development instead of "market development programs."

You see minus signs for "nuclear energy and environment, safety and health," and a big fat zero for "energy research."

But even the zero, frankly, is deceptive. The second chart shows that within the energy research category there are cuts for basic energy sciences, biological and environmental research, energy research and analysis, and facilities support for the labs.

The increases go to fusion and education programs.

Now this Chairman has never denied that the one area of research that was cut last time was in the fusion research program, but we sought to protect the other research and development programs.

Now here we have basically a proposal from the Administration for cuts in basic energy science, biological environmental research, energy research and analysis, and facilities' support for the labs. Okay?

Now we have a third chart.

This shows the real priorities.

Now here is where we are calling—on the last one we called for the cuts in those items. The third one shows the real priorities for the budget request.

There is a 25 percent increase for transportation. Now let's translate that. That 25 percent increase for transportation is more money for the big three auto makers, all of whom make a profit, and are making a profit this year, except some of them are closed down now I guess.

There is a 38 percent increase for the "Industry sector." Translation: that is money for a selected few big corporations to install energy efficient equipment and money for slick videos and brochures to promote energy efficient products.

Now let's note this right here. We are talking about the production of videos and brochures versus research and development.

If it would have meant research and development, it would have said "research and development." It is talking about "promotion" here.

It also shows a 61 percent increase for the "buildings sector." Translate that into saying: subsidies to builders and developers, again, to promote—"promote"—energy efficient products.

We are not talking about researching energy-efficient products; we are talking about promoting energy-efficient products.

Now I do not mind criticism from anybody about what my priorities are, and that is fine. We can all discuss that and we can criticize each other and try to let the public know where different people's priorities are. But let us not claim that this Committee is suggesting major cuts and reducing research and development which in fact that is what the Administration is doing, and what we are trying to cut are promotional and commercialization programs.

To discover where the money is going, we have to look no further than yesterday's Wall Street Journal. There was a story that describes how a \$100,000 grant from the Department of Energy and the National Science Foundation are being used to produce a TV pilot for a science drama along the lines of "E-R." Now, note, this is for a TV pilot—and here is the article I am talking about in yesterday's Wall Street Journal.

This is a \$100,000 grant being used to produce a TV pilot. It is not being used for research and development; it is being used for a TV pilot.

So let us be very clear here. If people want to criticize this panel, and they want to criticize the Republicans who are trying to set the priorities, fine. Criticize us for cutting out money for a TV pilot.

Do not criticize us for cutting out research and development.

[The article referred to follows:]

WEDNESDAY, MARCH 20, 1996 B1

Cops Have 'NYPD Blue'; Doctors, 'ER.' Now Scientists Want a Show

By BARBARA ROSEWICZ

Staff Reporter of THE WALL STREET JOURNAL

Some of the nation's best scientific minds are overseeing an experiment that could convince Americans . . . that scientists aren't so nerdy.

With \$100,000 in federal grants from the National Science Foundation and the Energy Department, a group of scientists has commissioned the writing of a prime-time TV drama to reach the science-illiterate through the boob tube. They hope it will not only impart information but do for scientists what "ER" does for doctors.

"If you ask [some people] to draw scientists, they draw a nerdy-looking person with glasses and a lab coat holding a test tube," says Hyman Field, the science-literacy expert who cleared the NSF grant.

So the TV scientists wouldn't be stereotypical geeks. They would have lives outside the lab—and romances.

In addition, each episode would teach viewers something about science, but would "have this so fiendishly, cleverly embedded in the story that [viewers'] education comes as a surprise to them," says Leon Lederman, a Nobel laureate in physics who helped lead the project.

Television-documentary writer Adrian Malone recently completed a story outline

with plots that seem as far-fetched as some from "The X-Files," Fox TV's science-fiction detective show, but are rooted in real-life research.

The action revolves around a corporate-funded research institute named — like the series — "GRALE," for General Research At the Leading Edge. In the proposed pilot, the institute ponders whether to pursue cell research that could prolong lifespans to 120 years and a graduate student balks at a high-energy physics experiment that could destroy the universe.

Is there really that much drama in the daily life of scientists? "There are many such incidents," says Dr. Lederman, "though not as many as we'll show."

Of course, this series may never make it to the small screen. The scientists are shopping it to producers and networks, but it has already been turned down by "X-Files" creator Chris Carter and Steven Bochco of "NYPD Blue" fame.

And even given a chance to change their image, some scientists may say "this isn't something any upstanding bench scientist could get involved with," says Daryl Chubin, a science-agency administrator. "But it's the same people complaining that kids aren't coming to their disciplines and aren't as good as they used to be."

Mr. ROHRBACHER. We cut out research and development for fusion last year. The rest of the research and development programs were protected.

What we tried to cut out money for, and were attacked on the Floor, is cutting out money for research and development for basically promotion programs and commercialization programs.

The budget is where the rhetoric meets the road. The budget is a clear indication that this Administration is completely willing to sacrifice research dollars, and scarce research dollars at that, to pursue what I consider to be trendy market promotion programs.

I will work to reverse those priorities.

The EPA's Office of Research and Development will present a budget request that reflects an increase of 13 percent. Within that budget, however, are major increases and cuts.

I look forward to Dr. Huggett's presentation of what is behind these specific changes.

EPA and the American Waterworks Association will also give testimony on reauthorization of the research provisions of the Safe Drinking Water Act.

So we look forward to basically talking with these people about these various subject areas and to having an exchange, and we will look at the needed level of funding, what research priorities should be, and what legislation is needed to encourage the use of innovative technologies in the Safe Drinking Water Program in particular.

Before I introduce our first witnesses, let me ask my friend from Indiana, the distinguished Ranking Minority Member, Mr. Roemer, for his opening remarks and any rebuttal that he would like to make to the statements that I just made in my opening statement.

[The prepared statement of Mr. Rohrabacher follows:]

OPENING STATEMENT

CHAIRMAN DANA ROHRBACHER

BUDGET AUTHORIZATION HEARING

MARCH 21, 1996

This hearing is making up for lost time so we have a lot of ground to cover. The Clinton Administration budget for Fiscal Year 1997 was delivered to Congress six weeks late and I understand that they are still "working the numbers" for part of the Department of Energy's budget.

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NOAA's FY 97 request of \$2,061,000,000 is up 9% from current funding. I have some concerns about this, but let me begin on a positive note. NOAA has taken heed of Congressional desires to eliminate the anachronistic NOAA Corps and to continue privatization efforts for the fleet and its specialized weather services. We will continue to support NOAA's weather privatization proposals, even though, as we speak, some pork-minded Senators are trying to sneak these programs into the Farm Bill Conference Report.

Although I would normally be concerned with the large increase requested for the troubled weather modernization program, known as AWIPS, I am reassured by the NOAA Administrator's testimony before our Subcommittee this month that he will accept a budget cap of \$525 million for the program.

The request does raise some questions.

—If we move forward with privatizing the fleet, why is this not reflected in a reduction in the new “civilian” NOAA corps?

—There is a seeming disconnect between the Administration’s request for large increases in NOAA’s satellite budget and the actual state of the program. For example, the March 12th announcement of a substantial delay in the polar convergence program seems to have had no impact on the budget request.

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The priorities in this budget request are even more disturbing. In short, this budget sacrifices science to fund pork. It gives the lie to the Administration claim that they support more money for energy research.

I have some charts to illustrate this. These are not my charts. They are the charts supplied by DOE.

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But even this zero is deceptive.

The second chart shows that within energy research, there are cuts for basic energy sciences, biological and environmental research, energy research analyses and facility support for the labs. The increases go to fusion and education programs.

The third chart shows the real priorities of this budget request:

—a 25% increase for transportation. Translation: money for the Big Three automakers.

—a 38% increase for the “Industry sector.” Translation: money for a selected few big corporations to install energy efficient equipment and money for slick videos and brochures to promote energy efficient products. (Note the difference: videos and brochures/research and development)

—a 61% increase for the “buildings sector.” Translation: subsidies to builders and developers to promote energy efficient products. (Note the difference: money for builders/research)

To discover where the money is going, you have to look no further than yesterday’s Wall Street Journal. This story describes how \$100,000 in grants from DOE and the National Science Foundation are being used to produce a TV pilot for a science drama along the lines of “E-R.” (Note the difference: TV pilot—research)

The budget is where the rhetoric meets the road. This budget is a clear indication that this Administration is completely willing to sacrifice scarce research dollars to pursue trendy “market promotion programs.” I will work to reverse those priorities.

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I look forward to Dr. Huggett’s presentation to see what’s behind these changes.

EPA and the American Waterworks Association will also give testimony on reauthorization of research provisions of the Safe Drinking Water Act.

We’ll look at the needed level of funding, what the research priorities should be and what legislation is needed to encourage the use of innovative technologies in the safe drinking water program.

Mr. ROEMER. Thank you, Mr. Chairman.

I am always delighted to hear your opening statement and to respond to your opening statement. Sometimes I disagree with it, Mr. Chairman. Oftentimes I agree with your concern for the taxpayers’ money and your vigilance toward making sure when we spend a dollar that that goes to the program that Congress intended it to go to.

Along those lines, Mr. Chairman, I would just ask unanimous consent that my rather lengthy opening statement be submitted to the record and I will just make some brief comments.

Mr. ROHRABACHER. Without objection, so ordered.

Mr. ROEMER. I would start off by quoting Thomas Jefferson who said that, "The price of democracy is eternal vigilance."

I think what President Jefferson meant with this statement—he applied this not just to the voter and the people that are out there making informed decisions that they need to be vigilant about what information they read, and that they make informed decisions about who they vote for—but I think he also meant in that statement about vigilance that the Legislative Branch has the responsibility to be vigilant toward the taxpayers' money.

I am very encouraged by the Chairman's opening statement where he indicated that he is willing to have more hearings on the oversight of how we spend money and how we try to save money in this Committee.

We are dealing with approximately \$6 billion here today in our oversight hearings. Now in previous Congresses, this Committee had sometimes 20 different hearings on these \$6 billion of expenditures. Today we are having one hearing, and some of the people that are testifying before the Committee such as the CFO are not some of the policy people that we might want to ask some very difficult questions about their programs to justify some of the expenditures.

Along those lines, many of us on this Committee, on both the Democratic and the Republican side, are concerned about some rather deep cuts in some programs—some of those on the renewable side; some of those on the fossil side; some of those on how we prioritize different programs.

We might want to continue to ask Dr. Baker in a subsequent hearing about AWIPS and about the modernization program that touches almost every single American's life out there in our districts from California to Indiana.

So certainly I would hope that we would have some additional hearings. One, Mr. Chairman, might be just on the energy accounts, the three accounts that we have under the jurisdiction of this program.

Secondly, we might follow up, as I suggested a few moments ago, with NOAA on their modernization and AWIPs programs and their NEXRAD RADAR program, and so forth.

Lastly, I would just say, as well, that we will be asking Dr. Robert Huggett about safe water, and following up maybe on what happened in Milwaukee last year that caused a significant number of deaths in our community and what we are doing to protect that from happening again, and why this is important for this Committee to be involved in that. And we will ask Dr. Huggett about some new research coming out with the publication of a new book, "Do We Have Something To Be Worried About?" in the future with plastics, and with microwave ovens, and with a new danger that may be affecting our community.

Do we have a chicken-little approach to that and say, "The sky is falling; this is terrible," on the one hand? We do not want to overcompensate.

On the other hand, we certainly do not want to dismiss something that the scientific community is paying a great deal of attention to.

We do not want to overregulate to compensate for that, but certainly we do not want to neglect that problem.

Where do we go in developing some new ideas, working with the business community and science, to try to protect our water and try to make sure, with the publication of this new book that may endanger our citizens' safety, that we look out for our citizens with new ideas.

So along those lines, Mr. Chairman, I am very encouraged by your concern about having additional hearings. And, as we worked together last year with Dr. Baker and Dr. Friday, I think we came up with a good idea, through extensive hearings, with the privatization of certain functions within the Weather Service to have the private sector now do, for instance, yacht forecasting for the yacht owners of Rhode Island and San Diego so the taxpayers in the Middle West are not paying for that service. That is saving the taxpayer I think about \$50 to \$60 million over the next 5 years.

I think that is a good bipartisan approach toward the jurisdiction that we have and the oversight that we have that Thomas Jefferson talked about.

So along those lines, I look forward to working with you, Mr. Chairman, in having some additional hearings, and I look forward to hearing the expertise from our four witnesses today.

Mr. ROHRABACHER. Thank you, very much. As long we do not end that subsidy for the forecast for surfing conditions off the Coast of California.

[Laughter.]

Mr. ROHRABACHER. Actually, there is a private surfing forecast, I want you to know, and they utilize the information that you provide. I cannot tell you how many times I purchased that service.

By the way, the general rule of thumb has been that the Chairman and the Ranking Member will be giving an opening statement. Anyone else who has an opening statement, it will be included in the record at their request.

However, we are joined by another Chairman, Mr. Weldon, who is the Chairman of his own Subcommittee, who has an interest in this area.

Do you have an opening statement, Mr. Weldon?

Mr. WELDON of Pennsylvania. Mr. Chairman, I just want to—I will submit it for the record, if I might, but I thank you for extending your leadership and this Subcommittee's cooperation in the series of three hearings that we have held on the vital issue of oceanography and ocean research. I appreciate that commitment.

That is a driving issue for me as Chairman of the Military Research and Development Subcommittee, where I have to leave to chair a hearing at ten o'clock. It will continue to be in this session.

NOAA will play and does play a pivotal role in this process. As we decrease budgets, we must not undercut the efforts of NOAA to continue to be a leader for us.

They are already doing great partnering programs. As you know, the SEAGRANT program is an outstanding success. The Coastal Ocean Program. I lend my support to your efforts, but also, Mr. Chairman, I look forward to working with you to make sure that NOAA is in fact a lead agency for this government in terms of these issues.

I thank you, and would ask you to allow me to put my written statement into the record.

Mr. ROHRABACHER. There is no objection.

[The opening statements of Mr. Weldon, Ms. Johnson and Mr. Fawell follow:]

STATEMENT BY CONGRESSMAN CURT WELDON

SUBCOMMITTEE ON ENERGY AND THE ENVIRONMENT

HOUSE SCIENCE COMMITTEE

MARCH 21, 1996

Mr. Chairman, thank you for holding this hearing today on the Administration's FY 97 budget request for the National Oceanic and Atmospheric Administration, the Environmental Protection Agency, and the Department of Energy. While I have to leave in a few minutes to chair a hearing in my own Subcommittee on Research and Development, I wanted to take a moment to focus on the work of the National Oceanic and Atmospheric Administration.

As many of you are well aware, I have worked closely this year with Chairman Rohrabacher and the Chairman of the Subcommittee on Fisheries, Wildlife and Oceans, Jim Saxton, on a bold initiative to find ways of strengthening and improving the way we conduct ocean research at the federal level. In January, we co-chaired a watershed hearing which brought together government agencies, academia, and industry to focus on leveraging oceanographic capabilities through partnering relationships. We were honored to hear from Dr. Baker on the important role NOAA plays in this process.

Not since the Presidential Stratton Commission on revitalization of oceanography, over 25 years ago, has there been this degree of interest and attention to the importance of oceans research. However, while we recognize the importance of understanding the oceans, federal support for basic oceanographic research has unfortunately declined. In fact, the Consortium for Oceanographic Research and Education (CORE), which is chaired by the distinguished Admiral James Watkins, recently concluded that federal support for ocean research has dropped from almost 7 percent of the total basic research budget to less than 4 percent in the past 14 years.

Thus, as we in Congress work to return fiscal sanity to the federal government, we have a responsibility to ensure that ocean research continues despite tight budgetary constraints. We can do this by ensuring there is a way to refocus research efforts, improve technology transfer, and encourage cooperation through partnerships to make it more productive and effective to meet the needs of the oceanographic community. The National Oceanic and Atmospheric Administration plays a pivotal role in this process.

There are many partnering initiatives already underway at NOAA which have proven successful. One example is the National Sea Grant College Program. This partnership between government, academia, and industry effectively utilizes federal dollars in basic research to solve real world problems such as the overpopulation of our coastal areas. I worked with Chairman Walker last year to ensure full funding for the Sea Grant College Program and believe we should continue to support this unique partnership.

The Coastal Ocean Program (COP) is another example of partnering between federal scientists and non-federal scientists to better utilize research dollars. In 1994, the National Research Council praised COP for quality, responsiveness, and appropriate focus. Through a process of high level oversight and review, COP partnerships allow NOAA to employ resident university expertise thus providing a better return on dollars spent.

Finally, through my role as Chairman of the Subcommittee on Research and Development of the House National Security Committee, I will continue to push for increased partnering between the Department of Defense, NOAA, and others in the oceanographic and intelligence communities. The end of the Cold War has ushered in a unique opportunity for the civilian use of classified defense and intelligence data. I will continue to support the efforts already underway at NOAA to work with the Navy to declassify relevant information that will prove invaluable to the civilian community.

In closing, as we begin to debate budget priorities for FY 97, I want to stress the importance of the many partnerships already underway at NOAA which promote

the efficient and fiscally responsible use of tax dollars. While I do have questions for our witnesses today, I will unfortunately have to submit them for the record. Again, I would like to welcome our panelists.

OPENING STATEMENT

THE HONORABLE EDDIE BERNICE JOHNSON

ENERGY AND ENVIRONMENT HEARING

AUTHORIZATION OF DOE, NOAA, EPA AND SDWA HEARING

3/21/96

I thank you for recognizing me and for calling this hearing this morning, Mr. Chairman. I look forward to hearing testimony on the Administration's Fiscal Year 1997 budget request.

In light of our recent hearings, Mr. Chairman, I am pleased to note that the Administration, in its request for the Department of Energy, has provided for a \$253 million increase in energy research and development. This increase is being accomplished while the entire Department maintains a level budget, with no increase for inflation. After hearing the testimony this Subcommittee received concerning the outlook for energy prices within the next couple of decades, I am gratified by the Administration's request.

Additionally, Mr. Chairman, I noted the Administration's positive overall approach to Department of Energy funding, which continues American commitment to fusion energy development and high energy & nuclear physics.

As a member of the Transportation & Infrastructure Committee, I am also very interested in our authorization process for the Safe Drinking Water Act research and development. The Transportation Committee has passed H.R. 2747, and I was pleased with the bipartisan effort put forth on that legislation.

I hope our witnesses today can comment on the appropriate level of research funding for the Safe Drinking Water Act, and that we can work in a bipartisan fashion on this Committee to protect the most valuable resource we have: our clean water.

STATEMENT OF CONGRESSMAN HARRIS W. FAWELL

SUBCOMMITTEE ON ENERGY AND ENVIRONMENT BUDGET HEARING, "FY 1997
REQUEST FOR DOE, NOAA, EPA, AND SAFE DRINKING WATER R&D"

MARCH 21, 1996

When Director of Energy Research, Dr. Martha Krebs testified before the Committee on Science on February 15, 1995, she emphasized the Department of Energy's commitment and priority of Fundamental Research in Energy and Matter, and Construction and Operation of Major Experiments and User Facilities. She went on to claim that "these aspects of our program . . . ensure(s) that our Nation will maintain its world leadership across a multitude of scientific disciplines." I couldn't have said it better myself. However, that was last year. Apparently, at least in the Department of Energy, much has changed during the last year.

When the Department of Energy Budget for Fiscal Year 1997 was released early this week, I reviewed the budget tables for evidence of the "commitment" to basic scientific research, and scientific user facilities, like the Advanced Photon Source soon to be dedicated at the Argonne National Laboratory. There was no sign of these budget priorities in the FY 97 budget. Rather, the Basic Energy Sciences account which supports energy-related research and scientific user facilities was actually cut for FY 97.

I searched further for the Department's supposed "priorities." I found Biological and Environmental Research, down 6.7%, Lab facility support, down 15%.

Perhaps a simple case of budgetary austerity? Not so. In fact, here is where the departmental priority came shining through. Solar building technology research increased by 157%, Renewable energy production incentive program increased a whopping 427%! Other increases came from the Departmental Administration Account; Policy, General Counsel, and Economic Impact and Diversity increased 13.3%, 10.4% and 6.5%, respectively. Perhaps these accounts need bolstering to defend the Department's misguided priorities?

As a member of the House Science Committee, I have always been a staunch supporter of the Department of Energy, the National Laboratories and scientific research. However, I am at a loss to see the Department's lack of support for basic and essential areas such as the Energy Research accounts. I echo the statement of Martha Krebs when I say that this investment ensures our Nation's world leadership.

I look forward to today's hearing and the chance to review the priorities of the Department of Energy.

Mr. ROHRBACHER. Thank you, very much.

Our first witness today is Dr. James Baker, Under Secretary of Commerce, and Administrator for the National Oceanic and Atmospheric Administration.

Welcome back, I should say, Mr. Baker. It is always a pleasure to be with you. I remember we had several meetings in my office, so we have developed a good working relationship.

Without objection, your full testimony will be entered into the record. I would ask you, if possible, to summarize your oversight and your overview of your testimony in about 15 minutes, if that is possible. We have four other witnesses and we are going to ask them to do the same.

I understand that is difficult to do, but that will leave us plenty of time for questions from the Committee.

Dr. Baker, you may proceed.

STATEMENT OF THE HONORABLE D. JAMES BAKER, ADMINISTRATOR, NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION, AND UNDER SECRETARY FOR OCEANS AND ATMOSPHERE, U.S. DEPARTMENT OF COMMERCE, ACCOMPANIED BY DR. ELBERT W. FRIDAY, JR., DIRECTOR, NATIONAL WEATHER SERVICE

Dr. D. JAMES BAKER. Thank you, Chairman Rohrabacher. I do not need that much time for my summary. I have a long statement for the record.

We do appreciate your support and the support of this Committee for the work that we are doing, and we appreciate this opportunity to testify on the President's 1997 budget for NOAA.

As the United States moves into the 21st Century, our domestic security and our global competitiveness will depend on the kinds of capabilities, the services, and products that are delivered by NOAA.

We believe that our proposed budget maintains an appropriate balance among the environmental assessment and prediction, and the environmental stewardship missions of NOAA.

Our budget reflects the President's commitment and Congressional priorities and mandates to meet the challenges that face our country by putting to good and efficient use the technology and the scientific information to ensure the security, prosperity, and vitality of the Nation.

The budget also reflects a high level of commitment by Commerce Secretary Ron Brown to the health and safety of the American people, to environmental technology, and to science-based solutions to environmental problems.

NOAA has provided the United States with the most advanced weather and climate prediction system in the world. We provided

the scientific base for managing natural resources and for solving environmental problems.

Our comprehensive system for acquiring observations which ranges from satellites, to ships, to RADARs, provides the quality data and information that are critical to the safe conduct of daily life and basic functioning of a modern, competitive economy.

Our total budget for the 1997 request represents both increases and decreases in current spending. In total, we request about \$2.21 billion in new budget authority. This request is a net increase of about \$112 million over the 1997 base, and \$171 million over the level of funding currently available in the Fiscal Year 1996 Conference Mark.

This increase is primarily driven by systems' costs, about 37 percent of our budget, but it also shows programmatic attention to Congressional mandates for resource stewardship.

In all cases, we are improving our wide range of services for the public.

Our budget reflects, as you pointed out, Mr. Chairman, program decreases and downsizing. We show a decrease of \$25 million for FTE and administrative reductions. By 1999, NOAA will have reduced its FTEs by more than 2000 people from the 1993 ceiling of about 14,000.

We have a strong commitment to efficiency and new partnerships in this downsizing effort. We have eliminated some services. We have re-engineered and downsized our ship operations.

We are eliminating the NOAA Corps. We are changing the way in which our seagoing capability is being provided by laying up NOAA ships and looking to the private sector for it.

Our budget is allocated accorded to a strategic plan element. The first of these is advancing short-term warnings and forecasts.

We have seen some dramatic improvements here just in the last year. The National Weather Service provided several days of advance warning for the Blizzard of 1996, projecting the storm's size, its intensity, and its duration with great precision.

Acting on these forecasts, airlines moved their planes from airports before the storm, thus avoiding costly down time, something they did not do in 1993.

During the 1995 hurricane season, the most active in 125 years, the Weather Service used some new forecasting techniques that have been developed in our research labs to reduce human and economic dislocation by reducing over-warning. That is, not warning the people if we did not have to.

Every 50 miles reduced saves about \$5 million per storm in evacuation costs.

In addition, the lead time for tornado warnings increased from 8 to 13 minutes, precious time for the public to prepare for those unusual and damaging storms.

Mr. Chairman, the losses from severe weather between 1991 and 1993 were more than 1,000 deaths and \$73 billion in damages.

The capital investment that the Congress has provided for modernization, including weather, radars, satellites, new computer models, and communications systems, is paying off with lives saved, property damage avoided, impacts mitigated, and economic

benefits for a variety of weather sensitive parts of the economy, including the surfers.

We are requesting about \$1.260 billion to address this strategic goal, which is an increase of \$112 million over our 1996 base. The increase is primarily due to satellites and other systems' costs.

There are some increases and some decreases. This is the largest part of NOAA, more than half of our activity.

The second part of our strategic plan elements is implementing seasonal to interannual forecasts, looking at the El Nino and Southern Oscillation phenomena.

In 1995 we began implementing monthly and seasonal probability outlooks. That is not quite a forecast, but we are getting towards that, for temperature and rainfall for the United States up to a year in advance.

For U.S. agriculture alone, the potential benefits for knowing when to plant, and what to plant, and how much water is available are estimated at close to \$3 billion.

In addition, the insurance industry has become increasingly vocal in its support of improving the science for climate forecasting due to the tremendous economic impact of weather and climate-related natural disasters.

The combination of a growing and migrating population, and changing weather patterns, has meant that insurance providers have paid out \$48 billion for weather-related losses since 1990, compared to \$14 billion for all of the 1980's.

Our goal here is to provide an operational program for the systematic production of regionally accurate climate forecasts. With such information, the farmers, the water managers, and the energy companies can make economic decisions in anticipation of drought or flood conditions.

We believe that this ability to deliver accurate climate forecasts will be as important to 21st Century economies and societies as weather forecasting is today.

We request \$116 million to address this strategic goal, a net increase of about \$7 million over the 1997 base.

Our third strategic goal is predicting decadal to centennial change. Our goal here is to provide accurate measurements of the changing environment and to develop the science and science-based options which are necessary for policy decisions.

NOAA played a critical role in the science of the ozone layer through measurements and through studies of atmospheric chemistry.

We are assisting industry in the selection of ozone-friendly substitutes for chloro fluorocarbons. This helps industry avoid bringing the wrong kinds of substitutes to the market, saving millions in product development. It is about a \$25 million saving for each product that is not brought to market.

NOAA's monitoring and studying the chemistry of near-surface ozone, an atmospheric pollutant so that the Clean Air Act can be implemented in the most cost-effective way. If we do not have to ban everything; the science shows what we have to do and what we do not have to do.

The more we know about the science, the more targeted our regulations can be. This helps all sides.

Through our accurate long-term monitoring, NOAA has produced the evidence that carbon dioxide and other relatively important trace species are increasing in the atmosphere.

We have, through our computer models and scientific insights, also provided information about potential future climate change caused by this increase. Such changes include increasing temperature, rising sea level, and changing distribution of rainfall.

These global changes will affect agriculture, energy, water resources, and the world-wide transmission of diseases.

To accomplish this goal, we have a request of \$92 million, which is somewhat down from the 1997 base by about \$9 million. That is because we have made some puts and takes in our budget and tried to have some high-priority items supported.

The final goal that I would like to discuss in this brief summary is the promotion of safe navigation.

We have been working closely with the private sector to revolutionize U.S. Marine and Air Navigation with accurate mapping and surveying, and new satellite-based geographical position systems.

This subject is the oldest part of NOAA, dating back to the establishing of the Coast Survey in 1807 by President Thomas Jefferson.

Mr. Chairman, the sea-going commerce has tripled in the last 50 years. 98 percent of our international trade moves through U.S. ports. And I should say, much of that through Southern California ports.

Fifty percent of that total tonnage is oil or other hazardous material. From 1980 to 1988, tankers were involved in more than 800 moving accidents, more than 50 fires, and close to 100 deaths.

Despite the risks that accompanies increasing traffic, and the competitive advantage of modern observations and systems, much of the Nation's charting and geodetic infrastructure is not up to world standards.

Over 60 percent of nautical charting data were obtained before 1940, and two-thirds of our tidal data is more than 40 years old.

Accurate charts and modern navigation systems are required for safe navigation. Studies show that one-third of the maritime accidents could be prevented by the use of electronic charts, a savings of close to \$4 million a day, a cost/benefit ratio of 6 to 1.

What we are proposing in this budget is doubling the amount of money we spend outside the government, contracts for survey data, increasing our new chart additions by 25 percent, going from 200 to 250 new charts; delivering even more rapidly our digital nautical charting database, and increasing our annual field survey work coverage by 40 percent.

We are requesting \$90 million for this goal, which is an increase of about \$1 million, once we do all the puts and takes in the budget.

In conclusion, Mr. Chairman, let me say that every day in some way every person in the United States is affected by the services that are provided by NOAA.

We believe that the 1997 budget represents the most cost-effective means to promote the Nation's environmental and economic well-being that we could devise.

We have cut where we could cut, and we have added only for those necessary systems' costs and broadly supported programs.

We are part of the President's budget that balances by the year 2002.

We welcome the continuing discussion on our goals, priorities, and operations with Congress, our constituents, and the public. Thank you for the opportunity to be here.

[The prepared statement of Dr. Baker follows:]

TESTIMONY OF
DR. D. JAMES BAKER
UNDER SECRETARY FOR OCEANS AND ATMOSPHERE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
U.S. DEPARTMENT OF COMMERCE

BEFORE THE
SUBCOMMITTEE ON ENERGY AND ENVIRONMENT
COMMITTEE ON SCIENCE
U.S. HOUSE OF REPRESENTATIVES

March 21, 1996

INTRODUCTION

Thank you, Mr. Chairman, and members of the Subcommittee, for this opportunity to testify on the President's FY 1997 Budget Request of the National Oceanic and Atmospheric Administration (NOAA). As America moves into the 21st century, our domestic security and global competitiveness will depend on the types of capabilities, services and products delivered by NOAA. I would like to address how this proposed budget maintains an appropriate balance among the environmental assessment and prediction, and environmental stewardship, needs of the nation. I am accompanied today by Diana Josephson, Deputy Under Secretary and Andy Moxam, the Deputy Director of the Office of Finance and Administration.

BUILDING ON AMERICA'S ADVANTAGES

NOAA's FY 1997 budget continues to reflect President Clinton's and this Administration's commitment to meeting the challenges facing America by putting to good and efficient use the technology, information, and global competition to insure the continued security, prosperity, and

vitality of our nation.. Building on America's advantages, NOAA has applied cutting-edge technologies and innovations, to provide the U.S. the most advanced weather and climate predictions system in the world. NOAA conducts research to improve operations, develop new technologies, and supply the scientific basis for managing natural resources and solving environmental problems. NOAA's comprehensive system for acquiring observations -- from satellites to ships to radars -- provides the quality data and information critical to the safe conduct of daily life and basic functioning of a modern economy.

The FY 1997 NOAA budget addresses these challenges with the need to invest wisely and to continue to build on America's Advantages. This budget represents the right level of investment to generate major environmental and economic growth -- throughout the nation to support the Department of Commerce's mission in protecting and promoting our economic resources as investment in the people, technology, and trade that will pay dividends far into the future. It also reflects a high level of commitment by Commerce Secretary Ronald Brown to the environment, the health and safety of the American people, and environmental technology. Indeed, investment in our Nation's and the world's environmental health is an investment in economic well-being.

NOAA's mission is to monitor, describe and predict changes in the Earth's environment, protect lives and property, and conserve and manage the nation's coastal and marine resources to ensure sustainable economic opportunities. This mission involves basic responsibilities of government for ensuring general public safety, national security and environmental well-being, and promoting economic growth. The successful execution of this mission depends on adequate funding for, and

synergism among, component activities of NOAA. NOAA plays a key role in a Department whose structure further encourages the integration of economics, environmental stewardship, environmental assessment and prediction and technology and information.

NOAA's services typically require highly concentrated investments but yield widely-dispersed benefits. These services affect the lives of nearly every citizen every day, thus NOAA's work represents a wise and appropriate investment by the taxpayer.

NOAA has institutionalized a strategic planning process that defines and validates its business activities, guides the development of implementing and operating plans, and forms the basis for management decisions. The Strategic Plan provides the framework for articulating and organizing the agency's goals and work objectives. NOAA's goals for the future will enhance opportunities for our citizens, the health of the U.S. Economy, the protection of our environment, and the sustainable use of our national resources.

To accomplish this vision, NOAA has established two missions:

- Environmental Assessment and Prediction, within which we have established four major goals: Advance Short-term Warning and Forecast Services; Implement Seasonal to Interannual Climate Forecasts; Predict and Assess Decadal to Centennial Change and Promote Safe Navigation.
- Environmental Stewardship, within which we have established three major goals: Build Sustainable Fisheries; Recover Protected Species; and Sustain Healthy Coastal Ecosystems.

The execution of NOAA's goal-based strategy depends strongly on a stable infrastructure and administration of human resources, as well as on the underlying capabilities of the agency as a national repository for research, observational systems, and data and information systems, for operational forecasts and resource management and stewardship.

NOAA has made the Government Performance and Results Act (GPRA) operational following strong participation as a pilot agency. During the pilot period, NOAA was selected by the Office of Management and Budget as one of ten exemplars, and was commended by NAPA's GPRA review panel. NOAA views the GPRA as a management tool to facilitate decision-making.

NOAA has integrated performance measures into its planning, budgetary, and management review cycles, and is designing a program evaluation process which will measure agency-wide progress toward meeting goals. NOAA's Strategic Plan provides the framework for our goal-based budget request for FY 1997.

HIGHLIGHTS OF THE FY 1997 BUDGET

The total FY 1997 NOAA request is \$2.1 billion in new budget authority. The request is a net increase of \$112.4 million over the FY 1997 base, and about a \$171.4 million over the level of funding currently available in the FY 1996 Conference Mark. This increase reflects NOAA's attention to its Congressionally-mandated responsibilities for resource stewardship, as well as providing the necessary level of support to continue critical technology modernization efforts which will improve a wide range of services to the public.

Included in NOAA's FY 1997 request is a decrease of \$25.4 million for FTE and administrative reductions pursuant to Executive Orders 12837 and the Federal Workforce Restructuring Act of 1994. These decreases are spread throughout NOAA. Including its efforts to streamline, by FY 1999 NOAA will reduce its FTE by over 2,297 from the FY 1993 ceiling of 14,309.

ENVIRONMENTAL ASSESSMENT AND PREDICTION MISSION

Advancing Short-Term Warning and Forecast Services - Our dynamic environment presents extraordinary challenges for protecting life and property. Each year, hundreds of lives and billions of dollars are lost due to environmental events that could be better predicted minutes to months in advance. NOAA's goal is to improve significantly its short-term forecast and warning services by enhancing abilities to observe, understand and model the environment, and by disseminating products and services to users more effectively.

The provision of weather warnings and forecasts is a unique public good and a clear government responsibility. With a growing population, the U.S. is becoming more vulnerable to environmental hazards and catastrophic loss. Losses from severe weather between 1991 and 1993 were 1,071 deaths and \$73 billion in damages. The capital investment required for NWS modernization -- including radars and satellites, advanced computer models and communications systems, and field restructuring -- is paying off with lives saved, property damages avoided, impacts mitigated and opportunities maximized for weather sensitive sectors of the economy.

The National Weather Service (NWS) modernization is yielding dramatic improvements in services and the level of safety preparedness. For example, the NWS provided several days advance warning of the "Blizzard of '96," and projected the storm's size, intensity and duration with great precision. Acting on these forecasts, airlines moved their planes from airports before the storm, thus avoiding costly down-time. During the 1995 hurricane season - the most active in 125 years -- the NWS employed advanced tracking and forecasting techniques to reduce significantly the human and economic dislocation created through the over-warning of coastal areas. In the case of hurricane landfall, reducing the area over-warned by 50 miles in a 24-hour forecast can save \$5 million per storm in evacuation costs.

For severe weather such as tornadoes, thunderstorms and flash floods, case studies document the impact of new technologies on safety. Bieringer and Ray (1995) found that the average lead time for tornado warnings increased from eight to thirteen minutes following availability of NEXRAD (Doppler radar) data. The percent of tornadoes receiving a warning before touchdown increased from 61 to 73 percent. Indeed, the NWS' outstanding performance during the West Coast severe weather events of last December gave emergency response officials and the public precious time to prepare for these unusual and damaging storms.

NOAA requests \$1,260.8 million to address this strategic goal, a net increase of \$112.6 million over the FY 1997 base. The objectives are to: 1) complete weather service modernization; 2) maintain operational satellite coverage; 3) strengthen observing and prediction systems; and 4) improve the application and dissemination of products to users.

These objectives will be accomplished primarily through the efforts of the National Weather Service (NWS), the National Environmental Satellite, Data and Information Service (NESDIS), and the Office of Oceanic and Atmospheric Research (OAR), to advance the science of weather forecasting, and improve weather-related observing technologies.

The FY 1997 budget requests \$471.7 million for NWS Operations and Research which provides funding for public weather and flood warnings and forecasts, and applied research. Included in this figure is government-wide administrative savings of \$5.0 million, and a reduction of 3 FTE and \$0.1 million to achieve NOAA's FTE streamlining goals.

Within the NWS Operations and Research figure is a net reduction of 213 FTE and \$3.1 million to Local Warnings and Forecasts base operations and the Modernization and Associated Restructuring Demonstration and Implementation Program (MARDI). In order to maintain the pace of the Modernization, within the funds provided, NOAA plans to fund the acquisition of the new NOAA Weather Radio Console Replacement System and the staffing and operations costs associated with the Secretary's Report to Congress regarding NEXRAD coverage and potential degradation of weather services.

Also included is a decrease of \$10.0 million in support of the Vice President's Reinventing Government (REGO) Initiative. First, concurrent with submission of the President's Budget, we are submitting a proposal to amend P.L. 102-567, the law governing weather service modernization. We expect this proposal to generate savings in FY 1997 by streamlining the

certification regulations related to weather service office closure. In addition, NOAA is proceeding with privatization of specialized weather services identified in the FY 1996 President's Budget (e.g. agriculture, fruit frost, fire weather for non-federal land management), and is continuing to work with the private sector to look for other opportunities. Included within the \$10.0 million decrease is a reduction of \$2.6 million for additional privatization efforts. Specifically, the NWS will transfer special outdoor event forecasting services to the private sector.

NOAA requests a decrease of \$2.0 million to reflect the termination of the Regional Climate Center Program (RCCs). As with the specialized weather services identified under the REGO initiative, the RCCs provide specific regional climate information that can be provided by non-Federal sources.

In support of our Enhance Observations and Prediction and our Improve Application and Dissemination objectives, NOAA seeks an increase of \$2.9 million for the Radiosonde Network to continue replacement of the NOAA radiosonde upper-air network that provides the principal data source for all U.S. Weather forecasts. The old system dates back to the 1950s, is obsolete and, in part, is no longer maintainable.

NOAA continues to modernize the NWS by acquiring technologically advanced systems. This is consistent with the goal of providing more timely and accurate warning and forecasts services to the public. The FY 1997 budget requests a \$66.7 million increase for NWS system acquisition.

A decrease of \$0.2 million is request for the Next Generation Weather Radar (NEXRAD) acquisition program. The decrease reflects near completion of NEXRAD system acquisition. The NEXRAD network will provide nationwide Doppler radar coverage, improve detection of severe weather and floods, reduce false alarms rates, increase warning lead times, and replace the obsolete radar network. The funds requested are required to operate and maintain the current NWS network of 120 NEXRADs and continue the acquisition of three new NEXRADs. These new radars were recommended by the Secretary of Commerce in response to the National Research Council's Study on NEXRAD coverage.

NOAA also requests a decrease of \$6.9 million for the Automated Surface Observing System (ASOS) program. The decrease reflects near completion of ASOS system acquisition. Funding is required to operate and maintain the current network of ASOS systems, complete the interagency full-scale production phase, and continued planned product improvements. During FY 1997, NOAA will increase its operational ASOS network to 307 NWS units.

The FY 1997 Budget request includes an increase of \$69.8 million for the Advanced Weather Interactive Processing System (AWIPS) program to continue critical software development activities and begin nationwide deployment of the AWIPS system. For the first time, AWIPS will integrate satellite and radar data and provide the local forecaster a capability that will significantly improve forecasts and warnings. In addition to supporting the remapping of GOES data, AWIPS will provide the communications capability needed to allow internal and external users access to much of NOAA's real-time environmental data.

NOAA requests an increase of \$4.0 million to continue to upgrade the Central Computer Facility, including the leasing and maintenance of the Cray C-90 supercomputer, upgrades to the NWS Gateway, and acquisition of additional workstations to speed up model development and improve data quality. This phased upgrades will continue to improve weather prediction modeling and increase accuracy of centralized forecast guidance products, especially for severe storms.

In support of the Satellite Continuity objective of the Advance Short-Term Warning and Forecast Services goal, NOAA is requesting a decrease of \$16.3 million. These funds support the procurement, launch, and operations of the geostationary and polar orbiting environmental satellites.

NOAA requests an additional \$54.0 million to cover the costs of the continuation of the GOES I through M spacecraft and instrument contracts and to begin procurement of four additional satellites of this series to assure continuity into the 2000s.

The Polar-Orbiting System request includes a decrease of \$25.4 million to cover the continuation of NOAA K, L, and M production, and the costs associated with the planned NOAA N and N prime spacecraft. This funding also includes the acquisition of additional instruments for the European satellite that will provide morning polar orbiting coverage starting in FY 2001. This reduction reflects planned cost changes in the satellite procurement funding program.

An increase of \$38.7 million is requested to develop the converged polar orbiting system which will succeed the current NOAA satellites and the Defense Meteorological Satellite Program (DMSP) of the Department of Defense after the current satellites have expended their useful lives. The program is a Tri-Agency (NOAA, DOD, and NASA) effort designed to eliminate unnecessary duplication of government services as recommended in the National Performance Review. By early in the next century, this program is expected to save one billion dollars.

A decrease of \$2.4 million for Ocean Remote Sensing provides funding to continue receiving and processing data from satellites operated by other countries. This data is made available to scientists, the maritime industry, and coastal zone managers,

NOAA requests an increase of \$3.1 million to maintain on-going satellite operations and product development and distribution.

Implementing Seasonal to Interannual Climate Forecasts - The largest interannual climate variability that has a degree of predictability is caused by the El Nino-Southern Oscillation (ENSO) phenomenon in the Pacific Ocean. Temperature and precipitation patterns, changes in ocean circulation, and changes in storm frequency caused by ENSO have global effect on economies and planning.

Based on the application of ENSO-related research, NOAA, in 1995, began issuing monthly and seasonal probability outlooks for temperature and rainfall for the U.S. for up to a year in advance.

Climate sensitive sectors of the economy will accrue benefits from these new "climate forecasts". For U.S. agriculture alone, potential benefits are estimated at over \$2.7 billion. In addition, the insurance industry has become increasingly vocal in its support of the essential science underlying climate prediction, due to the tremendous economic impact of weather-related natural disasters. Since 1990, insurance providers have paid out \$48 billion for weather-related losses, compared with losses of \$14 billion for the entire decade of the 1980's.

Emerging capabilities to forecast climate are the result of federal investments in basic research, development and deployment of global observing and data systems, and transition of research findings to operational needs. The future capacity to deliver uniform climate information will depend strongly on federal resources for continuing process and modeling research, and for the collection of data needed to initialize and validate climate models. NOAA's immediate goal is to introduce an operational program for the systematic production and application of regionally-tailored climate forecasts. Using accurate climate information, farmers will plant and irrigate more intelligently, managers will regulate water resources in anticipation of drought or flood conditions, and energy companies will prepare distribution networks to most efficiently supply points of expected demand. The ability to deliver effective climate forecasts will be as important to 21st-century economies and societies as weather forecasting is today.

NOAA requests \$116.6 million to address this strategic goal, a net increase of \$6.8 million over the FY 1997 base. The objectives are to: (1) Deliver useful seasonal to interannual climate forecasts for the U.S. and assist the international community in generating and using these

forecasts; (2) Enhance global observing and data systems required to provide data for the initialization and validation of model predictions of climate variations; (3) Invest in process and modeling research leading to improved predictions of temperature and rainfall distributions; and (4) Assess the impacts of climate variability on human activity and economic potential, and improve public education so that climate forecasts are understood and acted upon.

These objectives will be accomplished largely through the efforts of OAR, including the Environmental Research Laboratories and the Office of Global Programs and NESDIS for data and information services.

NOAA's research both in OAR and NWS over the past two decades in observing, understanding ocean-atmosphere coupling, and modeling has established the groundwork for the improvement we are already beginning to see in our Seasonal to Interannual forecasts. We have already achieved a level of skill that makes these forecasts useful for economic decision-making and have demonstrated that the forecasts can be applied with significant social and economic benefit in many regions of the globe. The next step is to improve the skill of seasonal forecasts, gain the ability to predict extreme events, and apply these results through delivery to users, both domestically and to U.S. interests abroad.

The research will continue the transition of climate observing system from research to operations, continue implementation of the International Research Institute (IRI) and operational climate forecasts, and improve seasonal to interannual climate modeling and prediction over North

America through process research programs. Funds are also provided to augment research and support of the Global Ocean Atmosphere Land System Program (GOALS) and the Global Energy and Water Cycle Experiment (GEWEX) Continental-scale International Project (GCIP).

The total request for NOAA's Office of Global Programs is \$68.7 million for FY 1997, an increase of \$9.6 million over the FY 1997 base. Funding for Climate and Global Change is split between the Implement Seasonal to Interannual Forecast and Predict and Assess Decadal to Centennial Change goals.

NOAA requests an increase of \$3.5 million for the implementation of the NOAA Virtual Data System Center (NVDS) that will modernize existing data and storage systems and vastly improve, streamline and simplify customer access to environmental data. For customers and data users, NVDS will permit ease of access, through a single gateway, to data stored at the three data centers located at different geographical locations. In addition to the increase above, and to reflect the improvement in services, NOAA proposes additional fees to private sector/for-profit concerns of \$1.2 million.

The FY 1997 request for LANDSAT is reduced by \$10 million due to the assumption by NASA of the development and funding for the LANDSAT-7 ground system. It is the position of the Administration that NOAA will operate the satellite after it is launched.

Predicting and Assessing Decadal to Centennial Change - Our planet is naturally a place of change, often with severe human impacts. Human activities now are inducing additional changes, with potential impacts of comparable magnitude. Human induced changes observed on Decadal time scales already are evident, including atmospheric pollution and thinning of the stratospheric ozone layer. Greenhouse gases being added to the atmosphere will reside there for decades to centuries. Greenhouse theory predicts that some gasses emitted by human activity will trap energy in the atmosphere and will raise the temperature of the earth. These changes create critical prediction and assessment needs for the world community. NOAA's goal is to provide science-based options for decisions regarding decadal to centennial changes in the global environment, specifically for: global climate change, ozone layer depletion, and air quality

Through long-term monitoring, NOAA has produced evidence that carbon dioxide is increasing in the atmosphere. During 1995, the U.N. Intergovernmental Panel on Climate Change (IPCC), the international body charged with assessing climate change phenomena and formulating management response strategies, released findings indicating that temperature may increase 1 to 3.5 degrees Celsius, and sea level may rise 15 to 95 centimeters, by the year 2100. These global trends will affect both natural processes and human systems, including agriculture, energy, and the worldwide transmission of diseases.

In collaboration with university, government and international partners, NOAA provides the measurements, process research, models and assessments that form the scientific basis for understanding global change phenomena. NOAA played a lead role in developing the science

assessments upon which the IPCC report was based. Decisions on actions to mitigate anticipated changes on the order of decades to centuries will never receive domestic and international backing unless they are supported by sound science. Alternatively, a failure to conduct the research needed to characterize the potential for global change will leave societies and economies ill-prepared to deal with real impacts, should they occur. NOAA works to provide science-based options for these types of decisions -- focusing on climate change and greenhouse warming, ozone layer depletion, and air quality improvement. For example, NOAA is assisting industry in the selection of "ozone-layer friendly" substitutes for chlorofluorocarbons (CFCs). Without research to evaluate the impact on the atmosphere of proposed CFC substitutes, industry could spend millions to bring a substitute to market, only to find later that it depletes stratospheric ozone.

Anticipatory research on long-term global change supports sustainable development by enabling society to make sound decisions to mitigate and adapt to climate change, to assess the utility of our large investment to reduce greenhouse gas emissions, and to improve regional air quality. The value of reducing climate-related uncertainty in the implementation of policies on stabilizing anthropogenic greenhouse gas emissions is estimated to be \$100 billion for the U.S. alone between now and the year 2020.

To predict and assess decadal to centennial change, NOAA must: (1) characterize the agents and processes that force climate change; (2) examine the role of the global ocean in influencing change; (3) ensure a long-term climate record; (4) guide the rehabilitation of the ozone layer; (5)

provide the scientific basis for improved air quality; and (6) develop predictive models, scientific assessments, and human impacts information on long-term change.

To accomplish this, NOAA is requesting a total of \$92.2 million for the Predict and Assess Decadal-to-Centennial Change goal. This includes net decreases from the FY 1997 base of \$4.8 million.

In support of our long-term Climate and Global Change objective, we are requesting an increase of \$4.7 million to maintain critical components of ongoing climate programs. This increase will augment research in support of near-term policy decisions regarding climate change issues. The issues include laboratory studies to measure ozone-depleting reactions and field investigations to characterize ozone losses and monitor the effect of substitutes. This includes the development of NOAA's international leadership role in designing and implementing global environmental monitoring networks, and key activities directed toward improving climate modeling.

In support of the Health of the Atmosphere initiative, NOAA is requesting an increase of \$3.0 million in Long-Term Climate and Air Quality Research. This program focuses on providing a sounder, more economical basis to ensure that emissions control strategies are both cost effective and successful in achieving the desired improvements in air quality. The information from this program is critical for evaluating the effectiveness of current emissions control strategies and ensuring that the best decisions are made regarding the future controls. This is important because

ozone damages agricultural crops and harvestable forests, and urban centers in heavily forested areas are finding it difficult to meet ozone standards using current control strategies.

Promote Safe Navigation - NOAA's goal is that merchant ships, fishing vessels, and recreational boaters will safely ply our coastal waters, electronically guided by space-based navigation and advanced information technologies by the year 2005. NOAA is working with the private sector to revolutionize U.S. Marine and air navigation, mapping and surveying and assist commercial shipping in moving increased cargoes safely and efficiently. NOAA will provide a precise satellite derived reference system as the basis for the nation's nautical data and geographical positioning needs.

The North Cape grounding, and Exxon Valdez before it, illustrate the catastrophic nature of some maritime accidents. Seagoing commerce has tripled in the last 50 years, and 98% of our international trade moves through U.S. ports. Fifty percent of the total tonnage is oil or other hazardous material. From 1980 to 1988, tankers were involved in 839 moving accidents, 55 fires and explosions, and 95 deaths. Despite the risk that accompanies increasing traffic, and the competitive advantage of modern observations and systems, much of the nation's charting and geodetic infrastructure is not up to world standards. For instance, over 60% of nautical charting data were obtained before 1940, and two-thirds of the data used for tidal predictions are more than 40 years old. The existing geodetic reference frame is obsolete.

Accurate charts and modern navigation systems are required for safe and efficient maritime and air transport. A study done by the Woods Hole Oceanographic Institute in June 1995, (Expected Safety Benefits and Costs of Electronics Chart Systems for Commercial Shipping in U.S. Waters, A Working Draft) states that one-third of maritime accidents could be avoided by the use of electronic charts, a loss savings of \$3.6 million each day. "Electronic charts systems... could realize cost benefits ratios of 6:1 from safety benefits alone." Comparing technologies, the cost-effectiveness of electronic charts is six times better than that for double hulled vessels and at least the same order of magnitude as the use of vessel traffic service systems. Another important benefit is increased operational time, that is, working in poor or zero visibility. Having an "all-weather" ability to enter or leave port eliminates the extremely expensive delays associated with unplanned ship and port facility schedule changes.

NOAA is working to revolutionize U.S. marine and air navigation, mapping and surveying, and to provide a precise satellite derived reference system as the basis for the nation's 21st-century nautical data and geographical positioning needs. During 1995, NOAA's National Ocean Service acquired and processed 50 hydrographic surveys, completed 200 new nautical chart editions, digitized 75 surveys in support of new electronic navigation systems, installed a real-time oceanographic monitoring system in San Francisco Bay, and implemented 25 of the planned 100 stations that will form the basic positional framework for the nation's future spatial data infrastructure.

NOAA requests a total of \$89.9 million to address the strategic goal to Promote Safe Navigation, an increase of \$1.1 million over the FY 1997 base. To modernize navigation and positioning services, NOAA must: (1) provide marine and aeronautical navigation systems that electronically integrate accurate chart data, Global Positioning System (GPS) based positioning, and real time environmental information; and (2) renovate the Nation's geodetic reference system to support full use of GPS for navigation and positioning. The FY 1997 request will maintain critical ongoing programs.

ENVIRONMENTAL STEWARDSHIP

Building Sustainable Fisheries - NOAA's vision for the next decade is to increase greatly the Nation's wealth and quality of life through sustainable fisheries that support fishing industry jobs, safe and wholesome seafood and recreational opportunities.

In 1994, the Secretary of Commerce authorized unprecedented measures to avoid the total collapse of the New England groundfish fishery. Actions taken to stabilize the fishery have been accompanied by federal and state economic assistance efforts in affected communities. Further regulatory and assistance measures are expected during this year in an effort to restore vitality to this historic fishery.

There is a strong consensus among lawmakers, fishery managers, the fishing industry and the public, that depleted fishery resources must be restored and healthy fisheries must be maintained and managed for greater efficiency. Of the U.S. fishery resources for which population status is

known, 33% are over utilized and 49% are fully utilized. Even fisheries that are producing a large catch are doing so with unnecessary cost and waste. Rebuilding and maintaining fisheries will promote the economic and biological sustainability of fishery resources, and assist the fishing industry in becoming more competitive internationally. Well-managed fisheries produce significant and continuous benefits, such as the \$1 billion Alaskan groundfish fishery. NOAA estimates that building sustainable fisheries will have a potential \$25 billion total impact on the national economy.

NOAA's National Marine Fisheries Service (NMFS) is providing the federal leadership and support to make this happen. Accurate and timely stock assessments are being used to guide management decisions, and guarantee conservation and wise use of fisheries resources. NMFS, the Coastal Ocean Program, Sea Grant and other parts of NOAA, are conducting research to advance fishery predictions, reduce costs of conventional stock assessments, and improve fishery habitat. Enforcement is carried out to ensure compliance with regulations, and NOAA is working with state and international partners to develop policies for managing fisheries that occupy multiple geopolitical boundaries. In addition, NOAA is assisting with the design and implementation of measures to reduce over-capitalization, including the application of access control and harvest capacity reduction programs.

NOAA requests a total of \$319.9 million to address the strategic goal to Build Sustainable Fisheries, a net decrease of \$9.1 million from the FY 1997 base. To Build Sustainable Fisheries, NOAA must: (1) assess the status of fishery resources; (2) advance fishery predictions; (3)

manage for economic growth by developing plans for reducing excessive fishing and capital investment; (4) ensure adequate compliance; and (5) provide research and services for fishery-dependant industries to maximize the potential from the Nation's marine resources and develop strategies to assist fishing communities during stock rebuilding periods.

Recover Protected Species - NOAA's vision is to conserve marine species and to recover those in danger of extinction. By 2005, NOAA will be on the road to recovering every marine species at risk and maintaining healthy marine ecosystems upon which they depend.

During 1995, NMFS implemented emergency sea turtle conservation measures in the southeastern U.S. shrimp fishery, which included reasonable and prudent alternatives to closing the fishery. This type of action illustrates NOAA's commitment to protect and recover endangered species in a manner compatible with the sustainable use of marine resources. NMFS is working to assess the status of threatened and endangered marine species, and is developing and implementing conservation and recovery plans to restore these species to healthy population levels.

There are compelling economic, biological and cultural reasons for ensuring the preservation of marine biodiversity. Finding ways to reduce interactions between protected species and human activities can mean the difference between proceeding with, or halting economic growth. By conserving living marine resources, NOAA enhances economic and cultural opportunities for future generations.

NOAA requests a total of \$65.7 million to address the strategic goal to Recover Protected Species, a net increase of \$4.0 million over the FY 1997 base. To recover protected species, NOAA must: (1) assess the status of, and impacts to, protected species; (2) reduce the adverse impact of human activity on protected species; (3) develop and implement conservation and recovery plans for depleted marine mammals and endangered and threatened species; and (4) prevent future listings by engaging in multi-species ecosystem management.

Sustain Healthy Coastal Ecosystems - By 2005, the Nation's coasts will have productive and diverse habitats for fish and wildlife, cleaner coastal waters for recreation and the production of seafood, and coastal communities with thriving, sustainable economies based on well-planned development and healthy coastal ecosystems. Allow me to give you a couple of examples from recent events:

On January 19, 1996, the barge North Cape grounded off Rhode Island, dumping nearly a million gallons of oil into coastal waters. Thousands of dead lobsters washed up on shore, and an extensive area was closed to fishing. As a trustee for the nation's coastal resources, NOAA supported federal and state response efforts by providing information on weather and tides, oil trajectories, natural resources at risk, and priority areas for protection. NOAA will also be involved in restoration of damaged fisheries habitats, other habitats, and the coastal communities that depend on them for fishing, recreation, tourism, etc. During all of 1995, NOAA supported rapid response operations at almost 70 spills.

These response, assessment and restoration actions are critical to monitoring healthy coastal communities. NOAA's wider stewardship role also focuses on prevention and sustainable use. This is an enormous challenge considering that over 54% of the U.S. population lives on the 10% of land defined as coastal. Coastal issues require integrated solutions because many problems transcend state and natural boundaries. Thus, successful management of these biologically, geographically and economically complex areas depends strongly on federal guidance and collaboration.

NOAA programs in monitoring, process research, modeling, assessment and information delivery provide the scientific basis for measures designed to prevent harm to coastal ecosystems while allowing sustainable development. NOAA's Coastal Zone Management Program provides financial and technical support in federal-state partnerships to manage coastal resources, minimize development risks, and unify coastal policies across states. For example, prior to Hurricane Opal's destructive landfall in Florida, NOAA had been supporting state efforts to prepare implementation plans for a post-storm redevelopment policy for beachfront areas. Application of this policy in the aftermath of Opal has ensured that re-development of the Florida shoreline will minimize risks and costs from future storms.

NOAA requests a total of \$186.9 million to address the strategic goal to Sustain Healthy Coastal Ecosystems, a net increase of \$3.8 million over the FY 1997 base. To sustain healthy coastal communities, and the healthy coastal ecosystems on which they depend, NOAA must: (1) integrate coastal management through a watershed-based framework that includes Federal, state,

local and private interests; (2) assess present and future environmental and economic conditions; (3) monitor indicators of coastal health; (4) understand and predict coastal ecosystem functions; and (5) improve public understanding of the value of coastal ecosystems, facilitate technology transfer and provide training to support sustainable solutions and prevent future losses in the nation's valuable coastal zones.

NOAA INFRASTRUCTURE

For NOAA to be able to achieve its mission, there are a number of underlying infrastructure elements on which all of our programs are built. For FY 1996, NOAA is requesting a total of \$9.6 million for programs in the High Performance Computing and communications, an increase of \$2.9 million. This increase will support major improvements in the Nation's ability to forecast the weather and predict climate change. The Nation will benefit from substantially improved dissemination of NOAA's vast amount of real-time and historical environmental data and information for use by the private sector, academia, state and local governments, and the public. For the NOAA Strategic Planning purposes, the display of the funding for this program is distributed among the seven goals.

THE BENEFITS OF PARTNERSHIPS

NOAA builds partnerships with universities; international, federal, state and local entities; industries and businesses; and groups and individuals to address common needs and leverage resources. For example:

- NOAA depends on universities to help accomplish science objectives in mission areas such as severe weather and global change research (through Joint and Cooperative Institutes), and marine research (through the National Sea Grant Program and the Coastal Ocean Program). NOAA has established a policy to maintain current proportions of in-house and extramural research.
- Weather and climate services are provided to the public and industry through a unique partnership between the NWS and the private meteorological sector. The NWS provides forecasts and warnings for public safety, and the private sector promotes dissemination of forecasts and the tailoring of basic information for business uses. This balance is a fundamental strength of the partnership, and has enabled the private meteorological sector to grow to an industry in the hundreds of millions of dollars.

NATIONAL PERFORMANCE REVIEW AND STREAMLINING

In an effort to create a government that works better and costs less, NOAA is reinventing itself by achieving the goals outlined in the National Performance Review (NPR). Weather service modernization, begun well before the NPR, is re-invention in the making. Owing to the range and effectiveness of new technologies, the NWS is realigning its field structure to reduce the number of offices from over 300 to 119. A National Institute of Standards and Technology study shows that every dollar spent on weather service modernization buys eight dollars in benefits for the taxpayer. The scientific and technological basis for this modernization has been provided by NOAA's own research and development capabilities, which now are being applied to maximize the benefits from the new systems. As a result, the U.S. now enjoys the most modern and efficient weather service in the world. A brief status of other NOAA NPR initiatives follows:

- Streamlining personnel and processes. NOAA will reduce its workforce by [16%] from 1993 levels. This will require the elimination of 2,279 full-time equivalents (FTEs) through phased annual reductions in the NOAA Streamlining Plan (see graph below). Approximately 74% of the total FTE reduction will be achieved in administrative and supervisory categories. By 1999, NOAA will increase its supervisory ratio by 7.7-1 to a ratio of 13.11 employees per supervisor. Organizational layers will be reduced from seven

to four. NOAA has simplified administrative processes, delegated authorities downward, and progressed toward implementing the Central Administrative Management System, which will greatly improve financial management and accountability.

- Converging satellites. NOAA is working with the Department of Defense to merge civilian and defense weather satellites, saving an estimated \$1 billion over the program life.
- Eliminating the NOAA Corps. The NOAA Commissioned Corps was downsized in FY 1995 from 403 to 369 active officers. NOAA intends to eliminate the Corps effective April 1, 1997, following a 6-month transition to a civilian work force. Legislation is required to effect this change. NPR savings are estimated at \$35 million.
- Closing NWS field offices. In order to expedite closure of about 200 NWS field offices, P.L. 102-567, the law which governs weather service modernization, must be amended. Our proposal will streamline the closure process and eliminate actions that are impediments to the realization of the benefits that were promised by the modernization. There is \$7.4 million in savings reflected in the budget for this in FY 1997.
- Privatizing specialized weather services. NOAA is proceeding with privatization of specialized weather services including agriculture, fruit frost, fire weather for non-federal land management, and regional climate centers, and is continuing to work with the private sector to look for other opportunities. In FY 1997, total NPR savings related to all privatization efforts are estimated at \$9.1 million.
- Expanding private sector ship support. NOAA has aggressively pursued an effective approach to providing ship services and has modified the mix of ship capacities over the past two years. NOAA has moved to an expanded use of charter, contracts for data, and UNOLS vessels in addition to NOAA ships.
- As part of this effort, three ships have been deactivated within the past year and replaced by contracts for data or chartering. NOAA has awarded a contract for hydrographic data collection in Long Island Sound, used a Corps of Engineers (COE) contract for data collection in Florida and has begun using an airborne laser system in a cooperative effort with the COE. The goal is private sector collection of at least 50% of hydrographic data. An additional vessel is expected to be deactivated and replaced by outsourcing within the next year. With FRAM funds made available by Congress over the past four years, the material condition of the remaining fleet has greatly improved with an expected life of at

least eight to ten years. NOAA is continuing to modify the mix of approaches to at sea data collection and the use of expanded outsourcing where effective and efficient.

GOVERNMENT-WIDE INITIATIVES

Through the National Science and Technology Council's (NSTC) Committee on Environment and Natural Resources (CENR), NOAA works with other federal agencies and non-governmental experts to design and prioritize the government's environment and natural resources research and development agenda. This interagency planning and coordination ensures the effective application of available resources.

The NSTC has identified Improving Environmental Quality as one of its six goals. Improving environmental quality requires the support of a broad and comprehensive research agenda, including programs in observing, documenting and understanding human activities, and providing solutions through the development, commercialization and application of technologies for pollution avoidance, remediation and monitoring. The environmental quality priority areas for FY 1997 include research on:

- sustainable use of natural resources and biodiversity, adaptive management and restoration of ecosystems, and evaluation of the ecological consequences of environmental change;
- economic and social issues needed to address human impacts on the environment; and
- development of risk assessment methodologies, integrated assessments, and other analytical tools for policy formulation.

NOAA's FY 1997 budget request addresses the Administration's environment and natural resources priorities as identified by the CENR.

NOAA is also participating at the six million dollar level in the President's initiative to restore South Florida--the Everglades and the Florida Keys. Funding for this initiative is spread equally among the National Ocean Service, Coastal Ocean Program, and the National Marine Fisheries Service.

CONCLUSION

As I have discussed above, NOAA is a science-based agency which heavily relies on its research for its operations. The Nation relies daily on forecasts, assessments, data streams and research results which NOAA provides. Within the FY 1997 request of \$2.1 billion for NOAA is a total of \$601 million for research and development activities. This is an increase of \$33 million or 6% over 1996 levels. NOAA's FY 1997 budget, including its research and development, represents the most cost-effective means to promote the Nation's environmental and economic well-being that we could devise. We welcome the coming discussions on our goals, priorities, and operations with the Congress, our constituents and the public. We believe that our budget will be well-received by all these groups because our budget represents appropriate levels of investment to generate major economic returns. Every day, in some way, every person in the U.S. is affected by the mission of NOAA. Our budget enables us to continue this service.

Thank you. If you have any questions, I am prepared to answer them at this time.

Mr. ROHRABACHER. Thank you, Mr. Baker.

My staff has pointed out that when I was reading my introductory statement that I had misplaced the dot, and it was "\$2,061,000,000" instead of "\$2,061,000". As Everett Dirksen said, a billion here and a billion there gets to be some real money.

So let me correct the record at this point that I misread where that dot was supposed to go.

Mr. Baker, how long will the NPOESS satellite system be delayed?

Dr. D. JAMES BAKER. We are looking, as you know, Chairman Rohrabacher, we are continually looking at ways to save money in our systems' cost. One of the ways to save money is by certifying that the satellites can last longer on orbit.

The longer they last, the more we can stretch out the program, the less we can spend.

Of course every time we certify that a satellite lasts a little bit longer, there is a certain risk in the system. What we are doing right now, we are in the process of now looking at whether we can in fact certify a longer life for the Polar satellites.

If in fact we can do that and we are satisfied that there is no additional risk, we are prepared to come forward with some cost savings.

I do not have those numbers for you right now. We are right in the middle of the process—

Mr. ROHRABACHER. It is a cost savings in the long run, but are there costs in the short run by following this strategy?

Dr. D. JAMES BAKER. No. There is a cost savings in the short run. That is one thing that we will be working with you directly on to identify.

Mr. ROHRABACHER. Now is that reflected in this year's budget?

Dr. D. JAMES BAKER. No, it is not reflected in the budget right now because this is a process which is ongoing. We have had a study going for a couple of years to look at the lifetime of satellites, and unfortunately the studies do not always give their conclusion at exactly the right time in the budget process. But we are trying to be as open as we can through the government regulations and procurement regulations to make sure that we are all on the same page in understanding what the savings could be.

Mr. ROHRABACHER. And if there is a savings, there is going to be some kind of an adjustment made, rather than just having that—

Dr. D. JAMES BAKER. No, absolutely. We will be up here, and we will be discussing that with you, and then we'll talk about how we can handle that.

Mr. ROHRABACHER. Quite often I find, and you will correct me if I am wrong because I am not just referring to your operation, or any particular operation, but a lot of times in government when people do end up making savings, we do end up never hearing about it because it goes into some kind of a fund that is used at the discretion of the head of the agency.

Frankly, what we would like to do is to see that if there are savings in the future, that we actually put that as part of our effort to balance the budget.

So that is just something we will have to work on. I think we have to develop a new type of thought pattern that goes out with people who handle government programs.

My father, for example, was a Marine Colonel. Some of you folks know about this. He was in charge of a fighter squadron, and he actually finished all of his missions with his jets with using a lot less fuel than they thought.

Lo and behold, his wing commander told him to send the airplanes up in the air and fly in circles until they used up all of their fuel, because they wanted to make sure that same fuel allotment happened next year.

Well, we've got to make sure that type of mentality changes. We have got to save as much money as we can and make sure that that is put towards balancing the budget, and that people who are running programs do not feel that they are going to be—that they can be proud that they have saved the taxpayers some money, rather than feeling that it is a penalty.

And I am not aiming that at you, sir, I am just saying that that is the general attitude that has been found in government in the past, and we hope to correct that.

In terms of your request for the AWIPS modernization system, which is as I understand \$120 million, but your last year's projection for Fiscal Year 1997 was only \$89 million. Why has there been this increase?

[Pause.]

Mr. Friday is welcome to give his name and give the answer.

Dr. D. JAMES BAKER. Let me ask Joe Friday to answer that specific question, Mr. Chairman.

Dr. FRIDAY. It is a phasing of the programs—

Mr. ROHRABACHER. For the record, could you state your name and position?

Dr. FRIDAY. It is a phasing of the program. We are making every attempt possible to put this system on line as rapidly as possible, and to change the profile with which we install the systems around the country.

We have not changed the overall program costs and total projection for completion.

Mr. ROHRABACHER. But the projection that you had in mind last year for this year was \$89 million and it has gone up to \$120 million. Does that mean your projection for future years will actually be going down, if you are going to be staying within that budget that you are talking about?

Dr. FRIDAY. It will be staying within the budget, consistent with the final negotiation for the implementation. That last phase, that negotiation with the contractor for the final implementation, still have to take place later this year.

Mr. ROHRABACHER. Are you going to be able, for example, to increase your spending here from the projected \$89 million to \$120 million but still stay within the \$525 million cap for the program that we agreed upon and that has been talked about and approved.

Dr. FRIDAY. We see no substantial change in that overall projection to estimated completion.

Mr. ROHRABACHER. So is that a "yes?"

Dr. D. JAMES BAKER. Let me give you a qualified "yes" on that.

[Laughter.]

Dr. D. JAMES BAKER. As I did at the other hearing.

We are basically—that is, NOAA is willing to live within a cap for this program. I cannot say that we have approval through the entire system for that, as you heard in the discussions at the hearing last time, but we think the number for the cap has got to be consistent with the final modified contract.

We are in the process of doing that. So the number is probably going to have to have some slight modification there, but as I said in the hearing, this is something that we think we can work with-in.

Mr. ROHRABACHER. Well, we want to have a first-class job. We want a first-class job done, but we also want to watch this creep in terms of the end number. It is going to require diligence on our part.

It seems to me that, right off the bat after we last year agreed to \$525 million, that all of a sudden we are seeing this indication that there might be some creep in the cost. I just want you to be aware that this Committee is going to be focused on this program.

Number one, we do not want you to sacrifice quality. That is not what we are suggesting. But we want to make sure that we remain diligent and try to obtain this budget cap.

So, thank you. I am pleased that you have agreed to terminate the NOAA Corps. Just how many NOAA Corps officers will actually be terminated under your plan?

Dr. D. JAMES BAKER. Mr. Chairman, as you pointed out, following your direction on this it was accepted by the Administration. I cannot give you an exact number because we are in the process now of putting together that implementation plan, but we have both—we had both an original downsizing plan for the Corps that took it down to about 250 officers, and now as we are transforming into a civilian activity there will be further downsizing and we will be up to you with the numbers as soon as we have that plan in place. But it will be an additional reduction. I do not have a final number for you, though.

Mr. ROHRABACHER. We do expect to be informed on that in a timely manner.

Dr. D. JAMES BAKER. We will do that.

Mr. ROHRABACHER. And you have taken steps already, I understand, to increase the use of private contractors for data and things that were done by the NOAA fleet that you are actually now getting that information from contractors?

Dr. D. JAMES BAKER. Yes, sir. You'll remember, you and I talked about this in your office and we are doubling the amount of money that we are spending with outside contractors for mapping and charting.

We are accelerating the layup of NOAA vessels so that we can go and work with the university community because they have some overcapitalization there. I have a meeting scheduled next week with them. We are working very closely with the private sector to see what they can offer us.

Mr. ROHRABACHER. Which sort of would fit in with one of my last questions here, and then I will move on to my other members of the Committee.

You mentioned Thomas Jefferson. Jefferson seems to have been quoted a lot in today's hearing about having been the President that first moved the country forward in charting its coastline in, I believe, it was 1807 you mentioned.

Was that done by actually government officials? Or did he have a private company doing that? Do you know?

Dr. D. JAMES BAKER. That is a very good question, and we should know the answer. Do we?

Our Director of the National Weather Service tells me it was done by the government.

Mr. ROHRBACHER. Excuse me?

Dr. D. JAMES BAKER. It was done by the government.

Mr. ROHRBACHER. All right. Now luckily today, with all of our advances in technology, we can turn to private companies to actually do some of the jobs that back in 1807 had to be done by the government. How much of the job, for example the charting jobs that you are talking about, can be done by private companies that you say need to be done?

You mentioned in your testimony that a lot of the information that we have is over 40 years old. How much of that can be done by private companies as compared to people who have to work for the government?

Dr. D. JAMES BAKER. We have done a detailed study of this subject because it is one that is obviously of great interest to us.

We would estimate that at least half of the work that we do, or that the government has done in the past, could be done by the private sector.

There are some areas where the private sector has not shown an interest, such as in remote areas of Alaska, for example, areas where there might be lots of liability involved, but there are many areas where the private sector has the capability and is very willing to do it.

So I would say at least half at the moment, and there may be more as we learn how to work together.

Mr. ROHRBACHER. And you are planning to move forward to exploit that potential?

Dr. D. JAMES BAKER. Absolutely. It is a high priority for us.

Mr. ROHRBACHER. Okay. Thank you very much. And I will perhaps come back to you with a few more questions after we move to the other members of the Committee.

Mr. Roemer?

Mr. ROEMER. Thank you very much.

Just following up on Thomas Jefferson who is very popular to quote and to reference in this morning's hearing, there is a new book out by Stephen Ambrose called "Undaunted Courage", and it cites the relationship between President Jefferson and Meriweather Lewis and Mr. Clark, and how vital Jefferson's relationship was both monetarily and in a personal relationship to, have a government role in trying to beat the British to the coastline, and what resources were used. I strongly recommend Ambrose's book. And by the way, he wrote "D Day" which was a great book put out earlier last year.

Along the lines of debate here, Dr. Baker, let me throw something out to you that you carefully followed last year. This Commit-

tee last year had a very, at times, contentious debate over a proposal to eliminate the statutory certification requirement when you close down a Weather Service office.

Some on the Committee advocated completely eliminating the statutory requirement. Others wanted to streamline the requirement in order not to endanger anybody back at home when an office might be prematurely closed down.

Are you willing to work with the Committee to develop some kind of legislative remedy toward solving this sometimes contentious problem?

Dr. D. JAMES BAKER. Congressman Roemer, we are very strongly supportive of streamlining that process. We think we have learned a lot with the establishment of the new technology. What we know today does allow us to go back and streamline the process.

We believe strongly there should be a process, because everyone wants to make sure their Weather Service is not being degraded, but it is possible we believe to have a streamlined process. We are very supportive, and we have proposed legislation that I believe we have worked on with your staff on that.

Mr. ROEMER. And we want to continue to work with you on that, Dr. Baker, and I appreciate that.

This year the budget for NOAA's Geostationary Satellites is again increasing. There has been a proposal under discussion to launch a GOES, a Geostationary Early Satellite, and park it in orbit until it is needed at a later date.

Have you studied this idea?

What are the budgetary and technical implications of this?

Can you share your views on this or get back to us on those views?

Dr. D. JAMES BAKER. Mr. Roemer, this is a subject also which we have great interest in because having a spare satellite on orbit gives us a more robust operational system. There is a certain amount of cost involved.

Sometimes the question of whether you store in orbit or whether you store on the ground, there are different costs that are involved there and there is a question whether you launch now or whether you launch later.

So there are puts and takes as we look at this process.

We are in the process right now of trying to decide how we would go forward, or whether we would, a GOES launch next April in trying to develop the cost and risk estimates. As soon as we have a clear view of what the options are, we will be up and talking to you and the staff about what the budgetary implications are.

Mr. ROEMER. So you will share those options with us before you proceed with either the park on the ground or the park in orbit?

Dr. D. JAMES BAKER. Absolutely.

Mr. ROEMER. Okay. Thank you, Dr. Baker.

The National Research Council completed a study of potential gaps in the NEXRAD RADAR System. You therefore recommended and agreed with the recommendation of the National Research Council of three additional NEXRAD RADAR to fill in these gaps.

Is this money in the budget?

Will you be proceeding with the necessary implications to implement this?

Dr. D. JAMES BAKER. Yes, sir, the money is in the budget for the three additional sites, and also for improving the communication at Caribou and Key West.

If we get the budget, we can proceed. If we get a Continuing Resolution for the rest of the year, we will be able to do the necessary actions that will allow us to go forward in 1997 with that.

But we do have in our request, we do have the money for those additional sites.

Mr. ROEMER. Okay. Thank you, Dr. Baker.

Thank you, Mr. Chairman.

Mr. ROHRBACHER. Thank you, Mr. Roemer.

Now Mr. Baker from California.

Mr. BAKER of California. Thank you, very much.

You have a great name, by the way.

[Laughter.]

Mr. BAKER of California. I am encouraged by your talks of privatization, especially in the San Francisco Bay Area. You mentioned about half of the mapping and charting are going to be done privately.

Could you give me a little bit more information?

NOAA has a demonstration survey project on the Bay Area? Are you aware of that project?

Dr. D. JAMES BAKER. Yes, I am aware of it, Congressman. I just had a recent briefing on the project. It is a cooperative activity between NOAA and the Port looking at providing real-time information for ships as they do their navigation.

It is I think one of the best examples of basic government scientific and technical information being taken over by the private sector and used in an economical and beneficial way.

We have suggested the Port of Los Angeles-Long Beach look at this process. As you know, we have some similar activities going on in Galveston and also in Tampa. But the San Francisco one has been a real model, because we have had the full range of the private sector involved.

And of course that is one reason is because the San Francisco area is very well organized with the groups that they have.

Mr. BAKER of California. And I am proud to represent part of that service.

What service does NOAA intend to contract in the private sector in this area? Which parts of this mapping and charting?

Have you any idea in what amounts this would be?

Dr. D. JAMES BAKER. In our budget now we are spending about, I don't have the exact numbers right offhand, but we are spending about \$2 million for contracting. We are going to move up to about \$4.3 million for contracting with the private sector.

The private sector has a lot of capability, mainly driven by the petroleum interests, and we want to make sure that we go out and contract with the groups that have the highest technology. This is really the best way for us to operate.

Mr. BAKER of California. Are you pretty confident that you can manage them, allowing the private sector to do it and you can require a certain amount of professionalism, as it were?

Dr. D. JAMES BAKER. Absolutely. This is—

Mr. BAKER of California. And availability to all interests, not just the oil companies', but other shipping interests?

Dr. D. JAMES BAKER. Well this is a cooperative effort. We do a lot of work with the private sector already.

For example, 80 percent of our satellite operations is done by the private sector. So this is a cooperative activity. It is an industry that we understand, and one that we think we can really work to get the quality data with the quality control that is necessary for life and safety.

Mr. BAKER of California. Okay. Well, we are working with the Coast Guard to make sure the same thing occurs, because they want to, at government expense, build so that ships can come in and out safely, they want to build a system and we are trying to encourage them not to.

Are you working with the Coast Guard in these port areas?

Dr. D. JAMES BAKER. We are certainly connected with the Coast Guard. Yes, we are working with them on that.

Mr. BAKER of California. Well, I serve on that Subcommittee, too, so I will look forward to seeing you over there. I want to continue to encourage you. I think privatization in these particular areas is very, very encouraging.

Thank you.

Mr. ROHRABACHER. Ms. Jackson Lee?

Mr. BAKER of California. Do I get a record for brevity?

[Laughter.]

Ms. JACKSON LEE. Mr. Chairman, thank you very much. I note my comments I heard as I came into the hearing, and I apologize for coming in late; there are several matters on the Floor. I am going to also apologize for having to leave. We are in the middle of markup in another Committee that I am participating in.

But I cannot think of a more important focus besides the Department of Energy, NOAA, and the EPA, and certainly dealing with the Safe Drinking Water research and development.

I will just reinforce my concern over the lack of hearings. I understood that the Chairman and our Ranking Member have commented on that, and I would like to join them in ensuring that we have oversight, and productive oversight, on these agencies that I happen to think are extremely vital.

I have said over the months that I have been here that what you do creates the work of the 21st Century. We are really engaged in the cutting edge of technology. You are at the cutting edge.

Government agencies very much have partnerships in this, and having oversight responsibilities we really need to attend to that.

So I am gratified, Dr. Baker, for your presence. As I looked at your name, I thought I had a Texan here. As you well know, we have got another Dr. Baker, a former Secretary of State, down in Texas, in Houston, and I had to look twice.

In any event, I am delighted that you are here.

Mr. Chairman, might I submit for the record, without objection, my statement—

Mr. ROHRABACHER. This has—

Ms. JACKSON LEE. I note that slight difference in looks.

Mr. Chairman, if I might just submit my opening statement for the record, without objection.

Mr. ROHRBACHER. Without objection.

Ms. JACKSON LEE. Thank you, very much.

I just want to focus on one question, Dr. Baker, if you would. I know we have been talking about streamlining, and I heard your responsiveness to that.

You know the high-performance computing program has also come under attack, and I would like for you to share with us the reason why NOAA has to be part of this Interagency Program.

What would be the impact if funding was trimmed in the coming year on this effort and on this partnership?

Dr. D. JAMES BAKER. Thank you, Congresswoman Jackson Lee.

This program is central to our ability to deliver weather forecasts. The original push for the ENIAC and the JONIAAC that were developed in the 1940's by John von Nemine and his friends at Princeton were to try to do a weather forecast.

Their first forecast took them 24 hours to do the 24-hour forecast.

[Laughter.]

Dr. D. JAMES BAKER. Well, we have gone a long way since then. The new computer allows us to take the next steps in weather forecasting.

The advances you see today are because we have had frontier R&D computers operating at the Weather Service at our Operational Center, and at our Geophysical Fluid Dynamics Laboratory and Forecast Systems Lab where we are always using the latest technology.

This is the hardest problem to solve that there is in science, trying to solve what we call the Equations of Motion for the Atmosphere.

With all due respect for the nuclear physicists and so on, this is a lot harder problem. All you have to do is ask Murray Gell-Mann who is a nuclear physicist and who got the Nobel Prize and is now trying to work on some of these more mundane forecast problems at the Santa Fe Institute, and he has come up against that.

Anyway, we are using advanced parallel processing now which is the latest kind of computer. That is what the HPCC program is buying for us. That is what we are using. We are making some wonderful advances now.

We used those ideas in improving the hurricane forecasts this past year. There is a direct relationship between that new technology and the improvement of our forecasts.

Ms. JACKSON LEE. Mr. Chairman, let me—you have really broadly and pointedly answered the question and, I might add, one I'm concerned about any potential in funding if we begin to look at the far-reaching impact of weather, or how you can make most Americans the unhappiest. That is, when their weatherman or weatherlady gives them the wrong prediction, who simply guides their life.

But on a more serious note, how far-reaching an impact this whole sense of being able to determine what these trends do in the atmosphere have economic impact. They certainly have social impact to a certain extent, and a safety impact, among others. And of course there is the science component.

So I would be very concerned and would want to see a continued interaction and funding, and I thank you for your response.

I yield back, Mr. Chairman.

Mr. ROHRABACHER. Thank you, very much.

Let's see if we have any—Ms. McCarthy?

Ms. MCCARTHY. No questions.

Mr. ROHRABACHER. No questions.

I would like to thank Dr. Baker. He has been not only a good witness today, but he has been very cooperative in his relationship with this Committee.

Dr. Baker, we do expect to work closely with you, and there will be some follow-up questions in writing that we hope you could respond to in a timely manner.

One last item, just for the sake of the Committee. That is, we are behind schedule, as I noted in the beginning.

We have just received the President's budget. This is not because we are totally behind schedule simply because of the lack of a Committee's diligence; we are behind schedule because we just got the budget.

We are going to try to do our best in making up for that, but like I said to Mr. Roemer, if in some way we miss certain areas that need oversight, we certainly will be having other hearings at the request of the members of our committee in specific areas that they believe need oversight as we move through this budget.

We just got it in our hands. In fact, we do not have the whole budget in our hands even right now, but we are trying to move forward.

This is kind of a situation that we have never had before where we have Congress in the hands of the Republicans and the Executive Branch in the hands of the Democrats, and we just have not gotten used to that type of relationship yet. But I am sure that will be decided by the voters in November, and we are going to try to do our best until then.

Thank you, very much.

Our second witness today is Mr. Joseph Vivona, the Chief Financial Officer of the Department of Energy.

Mr. Vivona, I know you have a lot of ground to cover, but I would ask you to summarize, if possible, to summarize in 15 minutes and then we will have some specific questions for you after you finish. So thank you very much, and you may proceed.

First of all, you have to turn your microphone and put it closer to your face.

STATEMENT OF THE HONORABLE JOSEPH F. VIVONA, CHIEF FINANCIAL OFFICER, U.S. DEPARTMENT OF ENERGY; ACCOMPANIED BY MR. JOSEPH J. ROMM, ACTING PRINCIPAL DEPUTY ASSISTANT SECRETARY FOR ENERGY EFFICIENCY AND RENEWABLE ENERGY; MR. RAY A. HUNTER, DEPUTY DIRECTOR, OFFICE OF NUCLEAR ENERGY; DR. JAMES F. DECKER, DEPUTY DIRECTOR, OFFICE OF ENERGY RESEARCH; DR. CLYDE W. FRANK, DEPUTY ASSISTANT SECRETARY FOR TECHNOLOGY DEVELOPMENT, OFFICE OF ENVIRONMENT MANAGEMENT; AND MR. ROBERT S. KRIPOWICZ, PRINCIPAL DEPUTY ASSISTANT SECRETARY FOR FOSSIL ENERGY

Mr. VIVONA. Mr. Chairman and members of the Subcommittee, thank you for the opportunity to testify on behalf of the Department of Energy's 1997 budget. I would like to go over the real budget constraints that we faced going into this process. These limitations in the budget are very real.

In 1993 the Department's budget was \$19.3 billion. The current budget in 1996 in Energy and Water, and the Conference Mark in Interior, sets it at \$16.3 billion.

Our 1997 request is also \$16.3 billion.

Our going-in assumption was to limit the 1997 budget to at least the 1996 level as best we could determine it during budget development, and it did serve as an anchor throughout the process.

Every time we thought about making a change or an adjustment, we used as a guidepost, coming in at or below the 1996 budget level.

Our challenge in this process is to maintain excellence in science and technology and the other missions, realizing that we will do it with fewer dollars. And we are all working towards the goal of deficit reduction and in the outyears a balanced budget.

Internal to the Department of Energy we had an array of management initiatives to live with these fiscal realities. The overarching process was a long-term strategic planning process to reshape the missions of the Department of Energy in the post-Cold War Era to meet national interests.

Strategic planning is the process by which we use to identify our priorities. Our other processes for reform—contract reform, which is basically how we get work done in the field; strategic alignment, which dealt with the federal workforce within the Department; and other management initiatives including task forces led by Yurgin and another led by Galvin, Bob Galvin, and in all of this we were driving towards building on our strength within the fiscal constraints, and that strength related to our core competencies in research and development and in science.

Now how does this play out financially?

All of these initiatives converge on the budget.

I mentioned the change in our appropriations levels between 1993 and today. Again, this request is for \$16.3 billion. It is 15 percent below the 1993 level before you calculate the effects of inflation on the real spending power in today's dollars.

What is the fact behind this?

Essentially, all roads lead to employment levels and employment reductions at the Department in order to meet the reduced budget capability that we have.

Today there are 30,000 fewer contract workers within the Department. These are people that run our labs, work at our environmental sites, and so on, from 148,000 workers to 118,000. Those are not projections. That is the current status of our downsizing initiative.

Our federal staff is down by about 920 people, from 13,600 to 12,700. That is a good way of explaining how you go from \$19 billion to \$16 billion. That is about \$2 billion in salary alone.

Our goal has been to get these efficiencies, and do so with compassion, and we've had success in this regard. Most of the people that have been affected by downsizing have not taken involuntary actions.

We've maximized the use of buyouts, retraining, community development, and other activities to downsize the Department in a reasonable fashion.

We've also had success in reducing regulations and other overhead costs.

In relating these budget issues to our mission, again our objective is to maintain excellence at our national laboratories and in our activities with the universities and industry, to use research and development to create and disseminate knowledge.

We seek to maintain U.S. world leadership in science, mathematics, and engineering and we are succeeding.

This past year, four of the five winners of the Nobel Prize in Physics and chemistry were affiliated with the Department of Energy.

In terms of outcomes, we seek economic growth and high wage jobs in the long term.

We seek national security.

We seek an array of cutting edge competitive technologies, clean and abundant energy sources, and improved health for our citizenry.

A good example of this relates to our beginnings and the development of nuclear weapons.

Today we yield zero-yield testing in line with the Comprehensive Test Ban Treaty. That is possible only if we succeed scientifically in determining and maintaining the reliability of our weapons.

We seek to use science to achieve that.

I would like to do a quick review of the numbers, if I may. You have a chart at the far end.

[Chart shown.]

The largest component of our budget is environmental management and environmental quality, roughly \$6.4 billion of our \$19 billion total.

The second highest portion relates to national security, just over \$5 billion. That includes defense programs, nonproliferation activities, and our dealings with surplus fissile materials.

Our science and technology budget is \$2.6 billion.

Our energy resources budget is roughly \$1.8 billion.

[Chart shown.]

In many ways we are a science agency, a research and development department, and we thought for your benefit we would display this chart which shows the distribution of research and development dollars by function or mission. About \$2.5 billion is gen-

erated in energy research, the green portion. A like amount in national security largely at our weapons' laboratories.

We have a portion going for environmental management, and about \$1.1 billion in R&D through our energy resources cluster composed of energy efficiency, fossil energy, and some other groupings.

With that I will close my remarks. I have brought with me programmatic experts from the various programs, and we are delighted to answer your questions.

Thank you.

[The prepared statement of Mr. Vivona follows:]

**Testimony of Joseph F. Vivona
Chief Financial Officer
United States Department of Energy
Fiscal Year 1997 Budget Request**

**House Committee on Science
Subcommittee on Energy, and the Environment
March 21, 1996**

Mr. Chairman and members of the subcommittee, I am pleased to present an overview of the Department of Energy's FY 1997 budget. Our FY 1997 total budget request is \$16.3 billion, of which \$4.8 billion supports the Department's non-defense programs within the jurisdiction of this subcommittee. The Department of Energy serves the nation by advancing science and technology, ensuring a secure national defense, providing for a more sustainable energy future, and improving environmental quality. Our FY 1997 request reflects the Administration's priorities and commitments in these areas. It also reflects our work over the past three years to reshape the Department of Energy so as to bring these services to the American people as cost-effectively as possible.

DELIVERING OUR CORE MISSIONS

Department of Energy research contributes substantially to the nation's scientific excellence. Over the past 50 years, DOE and its predecessor agencies have established an extensive National Laboratory and university network of expertise in science and engineering -- a network that has supported the research of over 60 Nobel Prize winners, including four of the five American winners in physics and chemistry in 1995. Through universities, industry, and our more than two dozen laboratories, with their numerous special user facilities, we support a major portion of the nation's federally funded research in civilian science, technology development, and engineering resources. Our research constantly replenishes America's capabilities for innovation in the areas of energy, environment, national security, and fundamental science and technology. In FY 1997 the Department requests \$2.55 billion for Energy Research programs. It is in the interest of the nation that these resources be sustained for the benefit of future generations.

The Department works to advance energy technologies that promote energy security and improve environmental quality. These advances are meeting the goals of the American public for a sustainable energy future. The clean energy technologies emerging from DOE research are increasing the nation's energy security and economic productivity -- and lowering America's energy bills.

Recent forecasts indicate that the nation's dependence on imported oil will rise significantly in coming years. At the same time, global energy demand, fueled by economic growth in developing nations, is projected to increase by 40 percent in the next 15 years. This new demand is expected to exacerbate problems with urban air quality and global climate change. Fortunately, new energy supply and end-use technologies and fuel substitution can dramatically improve global environmental quality and maximize U.S. energy security.

In FY 1997, we are requesting \$1.5 billion for nuclear, fossil, renewable and energy conservation research and development programs. Reductions in support for these activities are no bargain for the nation. The federal lead in sharing the costs of energy research and development is justified by energy and environmental trends that will affect the nation in the long run. The private sector cannot alone undertake the long-term research required to develop the energy technologies that will benefit the nation as a whole. This is why the Department of Energy leverages federal funding with non-federal resources to develop technologies for a cleaner and affordable energy future.

In addition to the Department's basic science and applied energy technology programs within the jurisdiction of this subcommittee, the Department manages defense related programs to meet the challenges of Post-Cold War nuclear threats and risks, and remediation of contamination at its nuclear weapons complex which spans 137 sites in 34 states.

CHANGES IN THE WAY WE DO BUSINESS

At \$16.3 billion, our FY 1997 request is the Department's lowest total budget in six years. This total is below the amount of the Department's current appropriation and is \$3 billion lower than our FY 1993 appropriation. Our request meets the President's deficit reduction target to achieve a balanced budget in seven years. This budget request balances prudent investments in program areas with the need to hold the bottom-line. The \$3 billion difference from our FY 1993 appropriation is the pay-off of three years of management initiatives and programmatic prioritization, that are now delivering high returns in programmatic and operational efficiency.

More than ever, American citizens are holding us accountable for superior results with increasingly limited resources. The Department of Energy is meeting these expectations. We now measure performance from a customer's perspective, strategically aligning plans, goals, and organizational structures with our vision. We are improving our process efficiency and effectiveness. In keeping with the Administration's commitment to streamline federal operations, DOE is reducing management layers and promoting employee responsibility. These changes -- along with improvements in contract reform and performance measurement -- are increasing accountability in all our activities.

Management Reforms

In May 1995, Secretary O'Leary announced a Strategic Alignment Initiative (SAI) committing the Department to achieve a \$1.7 billion savings through operational efficiencies over five years. For

FY 1996, DOE pledged SAI savings of \$221 million, to be achieved by reducing staffing by 10 percent; and decreasing operational costs through office closings, consolidations, and organizational efficiencies.

We are currently ahead of original projections for our SAI commitments. Using workforce management tools such as buyouts, attrition, outplacement, managed hiring and involuntary separations, we have eliminated 1,300 federal staff positions toward our FY 1996 target reduction of 1,380. This represents fulfillment of our promise to reduce such staffing by 10 percent. We have closed three field offices, vacated three Washington, DC office locations, consolidated several programs, and sold \$4.3 million of Cold War assets. The Department has projected decreasing support service contracting by \$120 million, reducing travel expenditures by \$40 million, achieving \$35 million of efficiencies in information resource management -- all within FY 1996.

We have reduced DOE's portion of the Code of Federal Regulations by 25 percent and reduced internal directives by 50 percent. These regulatory changes have eliminated unnecessary paperwork, improved operations, cut overhead expenditures, and relieved our customers of burdensome requirements.

The Department has reformed its procurement practices to promote competition for the management and operation of DOE facilities and sites, and to improve contractor performance, response, and accountability. We have initiated management contracts that award fees based on specific results, and we are compensating our contractors on the basis of performance evaluations. To save taxpayer dollars, we are adding incentives for cost avoidance and cost reduction in our new contracts and in FY 1995, we incorporated these reforms into nine of our largest contracts.

Also last year, the Department received the recommendations of the Yergin Task Force, a panel of experts convened to re-asses DOE's applied energy research and technology programs. In response to these, the Department expects to reduce research and development overhead costs by \$1.6 billion over five years.

We have established a Laboratory Operations Board to streamline management of our laboratories and a R&D Council to improve the coordination of DOE research. The Department will manage its research and development activities to maximize the mission benefits from collaborations with other agencies, universities, and the private sector, and to continue to improve its partnership practices and timely decision making.

FY 1997 PROGRAM HIGHLIGHTS

Science and Technology Leadership

In almost every scientific discipline, fundamental and applied research supported by the Department of Energy advances U.S. world leadership in science, mathematics, and engineering.

The Department's National Laboratories play a critical role in large scale, multi disciplinary research in the national interest. In the last three years, the Department's primary objective in the area of science and technology has been to maintain the value to the nation of our long-term research investments.

- Four of the five 1995 Nobel Prize recipients in chemistry and physics were scientists supported by the Department's predecessor agencies.
- In 1995, 33 of R&D Magazine's R&D 100 Awards went to Department of Energy supported technologies. Since the awards began in 1963, the Department has received more awards than all other government agencies combined, and more than twice as many as the top industrial winner, General Electric.
- Also in 1995, we announced the discovery of the top quark, the last of a family of six subatomic particles predicted by current scientific theory.
- In 1994, our efforts assisted in the location of a gene that contributes susceptibility to breast cancer in some women.
- Over the last three years, the Department's efforts have set world records for fusion power.

The FY 1997 budget request for the programs of the Office of Energy Research totals \$2.55 billion. Within the Energy Supply Research and Development appropriation, our request of \$1.54 billion supports the following major activities:

- A request of \$255.6 million for Fusion Energy Sciences to pursue a restructured fusion research program as recommended by the Fusion Energy Advisory Committee. Severe funding cutbacks in the FY 1996 appropriation, required the program to shift emphasis toward basic science research in support of fusion energy
- For Basic Energy Sciences, \$653.7 million is requested to support the continuation of ongoing research activities and operation of all user facilities. This level of funding will support ten scientific user facilities, research and design activities for a spallation neutron source, construction of the Combustion Research Facility, as well as high-priority peer reviewed research.
- A request of \$379.1 million for Biological and Environmental Research activities, which is a net decrease of \$27.3 million from the current appropriation. This program supports environmental research focusing on the consequences of energy production and use, risk assessment, transport of pollutants, environmental restoration and bioremediation technologies. Also supported is research in global climate change and health topics such as participation in the human genome project. Funds are requested to complete

construction of the Environmental Molecular Sciences Laboratory.

- A request of \$158.1 million for a restructured program now called Computational and Technology Research. This program supports the study of advanced computing applications and makes high performance computers available to DOE researchers, the Advanced Energy Projects program and the Small Business Innovation Research program, and technology transfer activities with industry partners. In addition, funds are included for a joint Energy Research-Defense Programs DOE 2000 Initiative, to develop tools to enable geographically separated scientists to work together more effectively.

Within the General Science and Research appropriation, \$1 billion is requested for the following activities:

- For High Energy Physics, \$679 million is requested to continue research that seeks an understanding of the nature of matter and energy at the most fundamental level and the basic forces which govern all processes in nature. The FY 1997 request includes two notable activities: support for the U.S.' formal negotiation of its involvement in the CERN Large Hadron Collider project, and continued operations and research at the accelerators. Funds are requested to maintain the construction of the Fermi Main Injector and the B-Factor at SLAC.
- For Nuclear Physics, \$318 million is requested to continue research that furthers knowledge of the structure of atomic nuclei and the fundamental forces required to hold nuclei together. Funds are requested to continue construction of the Relativistic Heavy Ion Collider at Brookhaven.

Energy Resource Research and Development

A recent forecast of the Energy Information Administration predicts that the nation's dependence on imported oil will rise to 54 percent of consumption by 2000. A secure supply of affordable energy fuels our nation's economy. The Department of Energy's strategy to address this issue is to increase the availability of energy options in the marketplace, and to work closely with industry to target research and development dollars more effectively.

In FY 1996, the Department's activities in energy research and development were diminished by cutbacks in funding, and, while we remain committed to our mission and to improved efficiency, our ability to achieve important objectives is imperiled. Opportunities to improve the nation's energy future are placed at risk.

Energy Efficiency and Renewable Energy

In 1993, the President launched the Climate Change Action Plan (CCAP) to reduce greenhouse gas emissions. The Department's Renewable Energy programs play a significant part in this plan, acting as the catalyst and partner with U.S. industry to deploy sustainable energy technologies to

consumers. The investment in Solar and Renewable energy programs is producing tangible results. In recent years, the Department's Photovoltaics program has achieved research breakthroughs with commercial applications such as integrating highly efficient solar cells into conventional roofing shingles. In a cost-shared industry partnership, the Department has developed a rooftop photovoltaic system expected to be offered commercially in early 1997 which delivers renewable energy to power homes.

The Department's energy conservation research and development programs are producing winning results such as development of the sulfur light which produces four times the light for a third the cost as compared to conventional lighting. This work received both the *Discover* and the *Popular Science* Technology Awards for 1995. Examples of other achievements include:

- partnerships with the private sector to save building owners as much as \$700 million a year in energy costs by 2000 through investments in energy efficiency equipment;
- in 1993, launched the Partnership for a New Generation Vehicle to work with the private sector to develop an affordable automobile with three times its current efficiency by 2004;
- developed a new methanol reformer that could bring fuel cell cars one step closer to the market. The new reformer is compact enough to fit under a car hood, and works to release the hydrogen bound up in methanol in the gas tank;
- through the industrial efficiency program National Industrial Competitiveness through Energy, Environment, and Economics (NICE3), the Department has led industry to save an estimated \$100 million a year since 1991 through reductions in hazardous waste and energy consumption.

The FY 1997 request for Solar and Renewable Energy programs is \$363 million, which restores the program to its FY 1995 funding level (as adjusted for use of prior year balances, \$361 million). This request funds a balanced portfolio of research and development in the near, mid, and long-term renewable technologies. The program's technology deployment activities are heavily cost-shared by industry. The request includes:

- A Photovoltaics program at \$87 million to continue research in manufacturing processes; commercial and residential applications; and validating utility applications of technology.
- A Solar Thermal program at \$24 million to continue research and development in three technology areas: power towers, dish/engines, and parabolic troughs. The program is working to reduce the cost of solar generated electricity from 17 cents/kWh to 5-7 cents/kWh.
- A Biofuels program at \$81 million to develop cost-competitive technologies to convert biomass into electric power production and liquid transportation fuels.

- A Wind program at \$50 million to continue research to enhance the cost-effectiveness of wind turbine systems to generate electricity.
- A Geothermal program at \$36 million to continue research that reduces exploration and drilling costs; locates and confirms undiscovered geothermal sources; and enhances the efficiency of converting geothermal power to electricity.
- A Hydrogen program at \$11 million to continue research and development in hydrogen production from renewable energy power systems, and hydrogen storage and transport technologies.
- An Electric Energy Systems and Storage program at \$36 million to continue research in the area of electric magnetic fields, high-temperature superconductivity, and electric utility system efficiency.

The Department's FY 1997 request reaffirms the Administration's commitment to energy conservation programs. Our FY 1997 request of \$715 million for energy conservation research and development reflects a \$176 million increase over the FY 1996 Congressional conference recommendation. Included in this request are increases for Administration initiatives: \$52 million for a total of \$152 million for the Partnership for a New Generation of Vehicles; and \$50 million for a total of \$84 million for the conservation portion of the Climate Change Action Plan. In total, the FY 1997 request proposes:

- \$221 million for transportation sector programs to continue to support development and commercialization of transportation technologies which have the potential to significantly reduce the projected U.S. and world demand for energy, particularly oil, and reduce the associated environmental impacts such as greenhouse gas emissions,
- \$159 million for industry sector programs. The FY 1997 program emphasizes the "Industries of the Future" partnership strategies with seven energy and waste intensive industries: steel, aluminum, metal casting, chemical, refining, forest products, and glass. These seven industries account for about 80 percent of all manufacturing energy use and 80 percent of the sectors' generated wastes.
- \$125 million for building technology sector programs to continue research and development in building system performance, building equipment and materials, and the implementation of energy efficiency codes and standards.

Fossil Energy

The United States relies on fossil fuels for about 85 percent of the energy it consumes. A key goal of fossil energy R&D is to increase the efficiency of fossil fuel recover, conversion, and end-use. The Department's investment in fossil energy research and development programs has

had tremendous payoff in the last three years. Accomplishments include:

- Ten DOE cost-share oil recovery projects now have made available at least 40 million barrels of additional crude oil. Moreover, these projects have encouraged additional privately-sponsored field operations, producing millions of barrels of additional oil from U.S. fields and hundreds of millions of dollars in additional tax and royalty revenue.
- A sophisticated methodology that allows State regulators to validate "area of review" variance requests for oil and gas disposal and injection wells has saved East Texas producers more than \$86 million in regulatory compliance costs.
- "Booked" natural gas reserves in Southwest Texas have been increased by nearly 4 trillion cubic feet due to DOE's support of a "secondary gas recovery" project that discovered large quantities of natural gas bypassed by standard field operations. Gross production revenues from these reserve additions alone could approach \$1.4 billion.
- Because of our investment in clean coal technologies, we have inaugurated a new era of clean electric power generation from coal. The November 8, 1995, dedication of the pioneering Wabash River Coal Gasification Plant in Indiana heralded an entirely new way to generate electricity from coal with sharply reduced environmental emissions and increased efficiency. In FY 1997, the Tampa, FL, and Sierra Pacific, NV, projects will add to U.S. leadership in gasification-based power technology.
- First commercial introductions of advanced environmental controls and clean combustion processes emerged from the Clean Coal Technology Program -- more than half a billion dollars in sales of retrofit and low-polluting burners alone.

The Department's request for Fossil Energy Research and Development is \$348.5 million, which is a 17 percent reduction or \$73 million below the FY 1996 level. This is consistent with Congressional guidance to reduce fossil energy research and development by 10 percent per year.

In FY 1997 many of DOE's gas and coal-fueled power systems will be entering their final phase of development. Evidence of a near-term pay-off will be seen in the availability of a number of attractive systems by 2000. This will permit us to pursue within existing fiscal constraints an affordable redirection of funding into long-term high pay-off R&D. Our remaining commitments to technology advances will be highly leveraged with industry cost-sharing. In our FY 1997 budget we are requesting:

- for coal, \$102.6 million. This funding will focus on developing progressively higher efficiency systems that significantly reduce CO₂ and exceed environmental compliance requirements through processes that prevent, rather than control, pollutant emissions.
- for gas, \$103.7 million. The FY 1997 program will continue a strong emphasis on

development of advanced high efficiency power generation cycles using both natural gas and coal resources.

- for petroleum activities, \$52.5 million. The FY 1997 program reduces funding for field demonstrations and emphasizes R&D. The supporting research program includes the development of advanced technologies for exploration, drilling, reservoir characterization, and extraction.
- Of the Bureau of Mines activities transferred to DOE in FY 1996, only the materials effort at Albany (\$5 million from the Fossil Energy program) and the environmental technologies group at Pittsburgh will remain at DOE in FY 1997. The health and safety functions are proposed for transfer to the Department of Health and Human Services.

Clean Coal Technology

The Administration's policy calls for limiting the Clean Coal Technology program to existing projects which have been selected or are currently under contract. This policy permits reductions to the prior year appropriations in FY 1997. The Department plans to review the current suite of projects and will make decisions on a schedule which allows for a proposed FY 1997 rescission of \$325 million with minimum impact on overall program objectives. Decisions regarding specific projects are expected to be made by the end of FY 1996 to achieve the proposed rescission savings. A provision of this request would delay the availability of \$313 million from FY 1997 to FY 1998. In addition, \$17 million will be available from prior year balances for administrative oversight of the program.

Nuclear Energy

In nuclear energy, the Department has moved from developing multiple technologies as potential civilian power systems to focusing on a single preferred technology, light water reactors. The Advanced Light Water Reactor program is carried out in co-operation with industry and works to standardize and certify reactor designs to meet the demand for electricity in the next century. In addition, the Department is working closely with industry to resolve critical technical issues in order to assure that the country's existing 110 nuclear power plants operate safely and efficiently well into the next century.

In FY 1997, \$248.1 million is requested for non-defense research and development programs within the Office of Nuclear Energy. This level will support reactor termination activities, enhancement of the current light water reactor designs, and the production of power sources for NASA missions, and development of electrometallurgical refining as a method of treating spent fuel. In addition to the \$72.2 million request for international nuclear safety and nuclear security activities, \$27.8 million is also requested in the Uranium Supply & Enrichment Activities appropriation for residual uranium program activities. The total request for the Office of Nuclear Energy is \$348.1 million.

The Department's FY 1997 request for nuclear energy research and development programs includes:

- The light water reactor program at \$40 million to complete the Nuclear Regulatory Commission design certification of two large "evolutionary" advanced light water reactors and continue design work on simplified, passively-safe reactors. With these funds, the Department will also develop and demonstrate advanced technologies to anneal reactor pressure vessels.
- The Advanced Radioisotope program at \$40 million to complete the construction Radioisotope Thermoelectric Generators for NASA's October 1997 launch of the Cassini mission and to provide Radioisotope Heater Units for the December 1996 Mars Pathfinder mission.
- The Nuclear Technology Research and Development program at \$30 million to continue development and demonstration of electrometallurgical treatment technology, which has the potential to condition DOE spent nuclear fuel and prepare it for long-term storage and ultimate disposal.
- The University Nuclear Science and Reactor Support program at \$7 million to provide critical support to nuclear science and engineering programs at U.S. universities and colleges and to provide needed safety upgrades and fuel services for their research reactors.

Other Non-Defense Programs

Environment, Safety and Health

The Fiscal Year 1997 Budget Request for the non-defense programs of the Office of Environment, Safety and Health (EH) is \$112.2 million, a decrease of \$7 million from the comparable Fiscal Year 1996 Appropriation. Despite less funding, the Office is able to "do more with less" through efficiencies achieved in reduced support service contractors and consolidation of training and other administrative functions.

EH is modeled after private corporations with the best environment, safety and health records. Based on the premise that systems that effectively manage environment, safety and health are also the key to improving the cost-effectiveness and efficiency of work, EH develops management systems for the line programs that proactively identify and efficiently cope with hazards before they cause accidents, disease or environmental contamination.

The FY 1997 request for non-defense Environment, Safety and Health programs includes:

- A request of \$29.2 million for the Technical Assistance Program. This program provides DOE line managers tools to manage safety at our facilities more effectively and at less cost.

to taxpayers. Through several joint projects, we have shown that we can do our work better, more safely, and at less cost by integrating safety into the planning and execution of our work

At Fernald, for example, we avoided nearly \$2 million in costs by recognizing and avoiding unnecessary work. This was because safety personnel worked side by side with engineers, planners, and other workers to "build in" safety and health concern into the actual planning of work. In much the same way, we saved \$500,000 through early identification and control of hazards at a Hanford plant. We expect this approach to become standard practice throughout the DOE complex and continue to save taxpayers millions of dollars year after year while also making work safer.

Also in its technical assistance program, the Office of Environment, Safety and Health conducts vulnerability assessments that identify weaknesses in the way we handle hazardous materials such as spent fuel, plutonium, and hazardous chemicals. Studies of spent fuel, plutonium and hazardous chemicals have already been conducted and one focused on highly enriched uranium is just underway. Overall, 281 of 503 corrective actions identified in the spent fuel report have been completed and 64 of 152 plutonium milestones have been met. For example, at the Hanford K-basins, actions were developed.

- For the Policy program, \$2.3 million is requested to provide to operate the Technical Standards Program in compliance with the Office of Management and Budget (OMB) Circular A-119, and activities necessary to implement the nuclear safety program.
- For the NEPA program, \$3.5 million is requested to assure compliance with the National Environmental Policy Act and related environmental review requirements necessary before project commitment.
- For the Radiation Effects Research Foundation activities, \$15 million is requested to support research programs in Japan to study the effects of radiation exposure in survivors of the atomic bombings of Hiroshima and Nagasaki

Environmental Management

The FY 1997 budget request for non-defense Environmental Management programs is \$651.4 million, a \$53.5 million or 9 percent increase over the comparable amount for FY 1996. Within the program's FY 1997 request:

- 55 percent, or \$358.2 million, is for Environmental Restoration activities. This request will continue efforts to identify the sources, nature and extent of contamination to more accurately determine relative risk, scope and cost of projects. The program will also increase the cost-effectiveness of assessment efforts by establishing objectives before characterization. As we have done over the past three years, continued emphasis will be placed on doing fewer studies and accomplishing more actual cleanup in FY 1997.

- The Waste Management program's request of \$199 million continues ongoing regulatory compliance efforts in FY 1997 in line with environmental, safety and health requirements. Priority efforts included in this request are continuing high-level waste treatment at the West Valley Demonstration Project to reduce risk associated with the storage of liquid high-level waste and implementing site treatment plans as negotiated through the Federal Facilities Compliance Act.
- The request for the Nuclear Material and Facility Stabilization program is \$91.4 million to provide for the deactivation and stabilization of surplus facilities and materials, as well as any surveillance and maintenance necessary to protect the public, workers, and the environment.
- Within the \$2.8 million FY 1997 request for Site Operation, is \$1.6 million for pollution prevention activities within non-defense funded programs and activities.

This concludes my summary statement highlighting the Department of Energy's FY 1997 request for the programs within the jurisdiction of this subcommittee. At this time, I would be pleased to answer any questions you may have regarding our FY 1997 submission

Mr. ROHRABACHER. Well, thank you very much, Mr. Vivona.

I was just interested in your figures that you just gave us in terms of the numbers of employees that were being decreased.

Are you claiming to us that there was an actual decrease in the numbers of employees in 1996, in your 1996 budgets?

Mr. VIVONA. There is a decrease in the number of employees in the 1996 budget.

Mr. ROHRABACHER. Well, I have something in front of me here that seems to indicate there has been an increase from 1995 from 19,626 employees for the Department of Energy budget, and in the 1996 budget it is 19,713.

I don't understand that.

Mr. VIVONA. In May the Department imposed a hiring freeze in line with its strategic alignment initiative. I think you are using federal employee levels, and that is a fair enough number to use. Since that freeze was put into place, the number of employees has declined by 920. I can provide the Committee, and would be glad to provide the Committee—

Mr. ROHRABACHER. We would like to get the accurate figures, if possible—

Mr. VIVONA. Certainly.

[The following information was received for the record:]

Department of Energy Manpower Estimates
(Excluding Federal Energy Regulatory Commission & Power Marketing Administrations)

FY 1995 Original End of Year Allocation	14,057
FY 1996 End of Year Target w/Strategic Alignment	12,677
FY95 vs. FY96 Target Reduction in Total DOE Manpower	-1,380
FY 1997 End of Year Target w/Strategic Alignment	11,503
FY96 vs. FY97 Target Reduction in Total DOE Manpower	-1,174

Mr. ROHRABACHER. Because this is what I have in front of me, and it looks like to me that what is happening is that there is an increase in the number of employees at the Department of Energy, and that the only decrease is basically being projected or something.

One of our basic complaints that we have had with the Administration is that the cuts always seem to be projected in the future.

Now if you are already making some cuts, I will be very happy to look at those.

Mr. VIVONA. Let me assure you of two things. We received Congressional guidance in the 1996 budget as enacted, primarily in Energy and Water.

That accepted the requirements of our strategic alignment initiative except where the Congress made additional reductions in employment among federal staff.

Against those numbers, we are making the reductions. Each month we have lost employees since the budget became real, actually going back to the previous May, and I can assure you that the numbers of filled positions among the federal work force are declining, and they continue to decline, and they will continue to decline.

We promised a reduction of 1,380 people from the 1995 level to the 1996 level. We are about 90 positions away from achieving that goal.

Mr. ROHRABACHER. All right. Well, I thank you very much, and we will be working with you on those numbers.

In talking about numbers, why have you not supplied the Subcommittee with your budget request for energy conservation?

Mr. VIVONA. Again, I apologize for that. It is something that should not happen. We were late in making some adjustments to that budget.

I understand that we had a meeting with staff yesterday, and I assure you that that budget will be delivered today or tomorrow, and again I apologize for its delay.

Mr. ROHRABACHER. Well it is, as you are aware, it is a matter of contention. I mean, I would not want to call it controversial, but it is just an area of disagreement of where priorities should be.

When we are going to have a hearing like this, some people over here may agree that that is an important priority, and there are some people over here who may believe that the money spent in that area is not justified, but that is what these hearings are for in order to have a discussion with you in terms of the value of those monies, and now that we don't really have your estimates we cannot have the discussion that I think would be very valuable for all us as members of the Committee.

Maybe you could describe for us the "Rebuilding America" program.

Mr. ROMM. Sure.

Mr. VIVONA. This is Joe Romm.

Mr. ROHRABACHER. Joe, would you state your name for the record and your position?

Mr. ROMM. Sure. Joseph Romm, Acting Principal Deputy Assistant Secretary for the Energy Efficiency and Renewable Energy Program. People tell me the title is just too long.

[Laughter.]

Mr. ROHRABACHER. I am sure you are trying to cut things down.

Mr. ROMM. Yes. The Rebuild America program is a program designed to catalyze a very disparate market of tens of thousands of commercial buildings, commercial building owners, manufacturers of energy efficient product.

With the realization that there is a huge opportunity to save perhaps one-third to one-half of energy used in commercial buildings, the Department has been trying to develop a program that would use the minimum amount of Departmental money to catalyze the savings that we all know are out there.

In the case of the Rebuild America program, we have been able to achieve remarkable leveraging. With about \$6 or \$7 million of Department of Energy money, we have leveraged about \$400 million in commercial and private sector money which will start saving of the order of \$200 to \$220 million per year in the energy bills of commercial buildings starting in the year 2000.

Mr. ROHRABACHER. You said this was "market categorization?" You do not consider this—this is not being presented to us as "research," as an energy research program, is it?

Mr. ROMM. No, this would not be considered a research program.

Mr. ROHRABACHER. So if we kept this program, we are not cutting research and development. We are cutting "market categorization."

Mr. ROMM. Well what you would be doing is increasing the energy bills of American consumers and taxpayers.

Mr. ROHRABACHER. Right. But we are not cutting "research."

So if we move forward and have to make some cuts in order to balance the budget, we will not hear from the Administration that by cutting this we are cutting research?

Mr. ROMM. No. You will hear that you are increasing pollution and raising people's energy bills.

Mr. ROHRABACHER. That will be a matter of debate. But last year we heard, when we made cuts in similar programs, we heard the words "cutting research and development" which was a totally different thing.

Now I do not mind debating the specific cuts we made last year on the merits of those cuts, but I believe there was a degree of dishonesty put forward in the debate last year and I just want to make sure that this year that, as we debate, whether or not that is an important thing and saves the taxpayers money, that is fine, let's talk about it.

So we have it officially now that this is not an energy research program?

Mr. ROMM. Yes, but I would respectfully say, Mr. Chairman, that the Congress did cut the R&D budget of the Department of Energy's Energy Efficiency Program last year. This was just not one of the programs.

Mr. ROHRABACHER. Sure. And we had a lot of energy research programs just like this one that we cut last year, and we can get into that, but now would you describe the "Solar and Renewable Energy Deployment Program?"

Mr. ROMM. I am not certain which program you are referring to. I mean, we have a number of programs to get renewable technologies out into the marketplace. Is there one in particular that you—

Mr. ROHRABACHER. Let me read it for you. It says: Solar and renewable energy deployment program entered under the Energy Efficiency/Renewable Energy, and it is an \$8.5 million request.

[Witnesses confer.]

Mr. ROHRABACHER. It says "Solar Renewable Energy Deployment."

Mr. ROMM. Yes. Yes, that is a small—

Mr. ROHRABACHER. \$9 million.

Mr. ROMM. That is a small program, but in part we—a fair amount of that, as I understand it, is our solar international work.

As you may know, particularly in the case for instance of photovoltaic, 70 percent of the domestic manufacturing is sold overseas. So we do have a, all things considered, relatively small amount of money going to try to capture what is an increasingly competitive international market.

Mr. ROHRABACHER. Okay, now let's get at this. "Trying to capture the international market?"

Now would you describe that as a research program?

Mr. ROMM. No.

Mr. ROHRABACHER. All right—

Mr. ROMM. I mean, there is a—no, I do not think that—

Mr. ROHRABACHER. So we just make this very clear—so if we have to make cuts and we are trying to figure out where our priorities are, that if we say we are going to cut that program, that we do not hear back from everybody, oh, my goodness, they are cutting research and development.

No, we may be cutting a marketing program.

We may—whatever it is; I mean, if you want to say we are destroying the environment, fine, but we are not cutting a research program.

Could you describe the Wind Cluster Deployment Program?

Mr. ROMM. I believe that that program is an effort to catalyze the wind market in the country to get—

Mr. ROHRABACHER. To “catalyze the wind market.”

Mr. ROMM. Well I think—

Mr. ROHRABACHER. The wind market in this country?

Mr. ROMM. If—for the purposes of—I am happy to stipulate that the programs that are “deployment” are not research and development.

Mr. ROHRABACHER. All right.

Mr. ROMM. We could go through them one at a time—

Mr. ROHRABACHER. All right.

Mr. ROMM. But I am happy to stipulate that programs that are designed—

Mr. ROHRABACHER. That is very similar to what we would say about the Operational and Maintenance Training for Commercial Building Operators, which is also a program aimed at building markets and commercializing technologies, but not in the development and research of new technologies.

Mr. ROMM. If it is training, it would not be research and development.

Mr. ROHRABACHER. All I am trying to do, which is clear, or which is evident now, is to make sure that as we move forward on a budget debate that we are doing so being honest with one another about what the issues are.

If this Administration is indeed committed to research and development, that is fine. But let us talk about research and development and not talk about deployment of marketing categories, and commercialization, and these sort of things because that is not the research and development of new technologies.

That is the point I am trying to make here, and obviously your testimony is backing up the idea that these things are not indeed research and development, although they may be very worthy items and I would be willing to concede to the other members of my Committee that these may be needed, and they may be worthy of spending money on, but we should be making sure that our debate is on an honest and up-front level rather than trying to—

Basically last year I remember when it got on the Floor we talked about cutting the solar energy research and development. I seem to remember going to great lengths to make sure that the actual research and development was not touched, and that we were actually just cutting down the marketing and commercialization of those programs.

Mr. ROMM. Well, I think that one has to draw a distinction between commercialization and deployment. The Department really does not do a lot of commercialization that I am aware of.

By and large—I mean, we had a commercialization ventures program, but that really has been almost completely eliminated.

I think that when one looks at the research and development pipeline, you know, one has to bear in mind that it is not a linear process; and that indeed in getting technology field-tested in the marketplace, and getting utilities familiar with photovoltaics and wind, that that indeed creates a feedback of learning for the manufacturers in the research and development process.

So it is a very complicated business as to what exactly——

Mr. ROHRABACHER. Am I being unreasonable in claiming that research and development is “research and development” and commercialization and marketing is “commercialization and marketing?”

Mr. ROMM. Well, one can look at it two ways. One can create arbitrary distinctions and talk about them; or one can try to maximize the national benefit of creating jobs, improving the environment, lowering energy costs——

Mr. ROHRABACHER. Some of us I know believe that we have our own corner on the share of knowledge that is necessary to determine what is best for the American people, and in terms of whether a balanced budget is less important than these specific areas that we want to make sure get into the marketplace.

Others of us believe that we need to have an honest debate on this, and setting honest categories down in honest categories of what we are talking about is an important part of that debate.

While you are here, let me ask you. There is in this budget request another \$40 million for the “Testing and License Certification Activities for Advanced Lightwater Reactor.”

Can you explain why tax dollars should be given to Westinghouse, and General Electric? These are corporations whose after-tax profits are \$4 billion—and we are talking about giving them \$40 million?

That is just so Joe will know that I just do not go after the renewables and the solars and the rest of these commercializations.

[Laughter.]

Mr. ROHRABACHER. Would you state your name for the record, and your position for the record, please?

Mr. HUNTER. Yes, sir. My name is Ray Hunter. I am the Deputy Director of the Office of Nuclear Energy, Science, and Technology. I had the opportunity to testify before you last year——

Mr. ROHRABACHER. Yes, sir.

Mr. HUNTER. And tried to at that point explain this Lightwater program.

We are phasing this program out, but it has been a partnership between the industry, the utilities, and international partners in trying to come up with advanced lightwater reactor designs.

Mr. ROHRABACHER. Now “partnership” could be spelled “subsidy.” Is that not another way to spell “subsidy” is “partnership?”

Mr. HUNTER. Well, it is cost-sharing.

[Laughter.]

Mr. ROHRABACHER. All right. Well, we have got companies here worth \$4 billion.

Now just to be fair about it, some of the little companies that are just trying to break into the energy market, that Joe would like to see succeed, and I am sure has a good heart and wants what is best for our country, they do not have \$40 million to break into the market, but Westinghouse and General Electric certainly do, so why should we be giving them, as part of this cost sharing, the \$40 million when these other companies that I am trying to get catalogued correctly as marketing, are looking for some help to get into the market?

Westinghouse does not need to get into the market; they are already there.

Mr. HUNTER. Again, we initiated this program in the late 1980's. It has been a cooperative, cost-shared program where the industry and the utilities who have contributed more than the government.

Mr. ROHRABACHER. I am sure.

Mr. HUNTER. The intent was to provide the United States with advanced liquid—lightwater reactor designs for possible future use.

Now we recognize that in today's environment with the budget constraints that are there, we are bringing these activities to what we believe is a logical conclusion by accomplishing the design certification.

Mr. ROHRABACHER. And how long will that be?

Mr. HUNTER. We will complete the overall program in 1998.

Mr. ROHRABACHER. So that is another how many—how much money are we talking about? How much is projected to be spent here?

Mr. HUNTER. We are projecting \$40 million in fiscal 1997, and we have not worked out the 1998 budget but I think it would be in that same range.

Mr. ROHRABACHER. So altogether we might be talking about, including this request, another \$120 million?

Mr. HUNTER. No, sir. Forty—\$80 million.

Mr. ROHRABACHER. Okay, I've got you.

So that is \$80 million to go to Westinghouse and General Electric.

Mr. HUNTER. Well, there—

Mr. ROHRABACHER. Don't you think they are capable—I mean, admittedly maybe we have made some agreement, but we are trying to balance the budget and there are a lot of people who around the country have learned to depend on certain government programs that we are now saying, "I am sorry but we no longer can subsidize this program."

Should we not turn to major corporations that are making, you know, large profits and feel just as comfortable in saying, "I am sorry but because we are trying to balance the budget we can no longer meet that commitment?"

I mean, if we are willing to reduce whole categories of help for specific individuals in our country who are less well off but we feel that could be better off being independent and not having to be dependent on specific government programs, why can we not do that to a big corporation?

Mr. HUNTER. Well, in addition to the big corporations that you are talking about, Westinghouse and General Electric, and we also have ABB-Combustion Engineering involved, we have international relations in this program with Belgium, Bulgaria, China, the Czech Republic, England, Estonia, Finland, France, Germany, Indonesia—

Mr. ROHRABACHER. Are they all putting in \$40 million a year?

Mr. HUNTER. They are part of this program.

Mr. ROHRABACHER. Well—

Mr. HUNTER. They are contributing—

Mr. ROHRABACHER. I have heard people—

Mr. HUNTER. It is a cost-shared program, sir. That is the point. The \$40 million we are putting in as the Federal Government is being leveraged by international contributions, plus contributions—

Mr. ROHRABACHER. We will take a look at this. I would just like to see how money the Mainland Chinese are putting into this. You know, we end up so often, you know, Uncle Sam puts in \$40 million and they put in \$100,000, and then they get to share everything we come up with.

Mr. HUNTER. Well, up through 1996 the total that industry has put into this program is \$349.2 million versus the government investment of \$228 million.

Mr. ROHRABACHER. That is American industry?

Mr. HUNTER. Beg your pardon?

Mr. ROHRABACHER. That is American industry?

Mr. HUNTER. Yes, primarily.

Mr. ROHRABACHER. Well, I think that if they are willing to put the money in—excuse me.

Is Combustion Engineering a foreign corporation?

Mr. HUNTER. It is now owned by a foreign company.

Mr. ROHRABACHER. So a foreign corporation is actually getting the \$40 million.

Mr. HUNTER. When we started this program, it was an American-owned company.

Mr. ROHRABACHER. Yes, well, you know, hopefully by the time we finish, General Electric and Westinghouse will still be American companies, too, but who knows. I mean, after all, the Chinese had a \$40 billion surplus last year, trade surplus with the United States. They have got lots of hard currency to float around, and they pay their people nothing.

Well, listen, thank you very much. But as you can see, I am a little skeptical about spending that. I just want people to understand that I am not coming at balancing the budget from some sort of a perspective that everything Joe over here is trying to do with renewables is just liberal poppycock, and everything that standard businessmen with red ties and who meet at country clubs every day and are involved with the nuclear industry, that everything they do is really solid, but everything over here is just a bunch of hippies from the 1960's.

That is not it. That is not the bias. The only bias I am operating from is: we have got to balance the budget.

We cannot expect the American people to pay for things anymore that can be done by private industry. If a private company can do

it, and private individuals, or if an individual himself can do it for his family, or her family, then the government should not be involved, and that is how we are going to balance the budget.

But if we get involved in all kinds of these enterprises, even though we may think we know and think we have the corner on what is good for America on this stuff, we are not going to balance the budget.

If we do not balance the budget, we are going to end up in an economic crisis and our people are going to be spending more money on interest rates, and it is going to have a major impact on future generations.

So we have got that commitment. And again, I am not coming at this in a biased way. We just want to try to do what we can to make the best decisions with our limited budget.

Mr. VIVONA. Mr. Chairman, on the pathway to balancing the budget, which is a goal we agree on——

Mr. ROHRABACHER. Yes.

Mr. VIVONA. Again, as we stated earlier, without trying to make it more dramatic than it really is, within a 4-year period of time, and with help from the Congress, this Department reduced its budget in fact by \$3 billion. That is a contribution towards deficit reduction.

But it is the policy of this Administration on the path to a balanced budget to invest in people and in business to help grow the economy, and it has succeeded in some measure, again with your help, in doing that.

I think you should take a more holistic view of what occurs when a cut is taken.

Mr. ROHRABACHER. "Holistic" is one of those 1960's words, isn't it?

Mr. VIVONA. Well, it does not do much good—I was not even around in the 1960's——

Mr. ROHRABACHER. I was.

[Laughter.]

Mr. ROHRABACHER. I learned my lesson.

Mr. VIVONA. Again, I was not around.

[Laughter.]

Mr. VIVONA. My history does not go back that far, but in trying to parse particular initiatives, if we are ready for a deployment and it creates jobs, it is just practically good to pursue those interests.

Again, we are with you on trying to balance this budget. But we also think we should do it with compassion, and that we should also invest in the environment and invest in energy, and invest in technology.

Mr. ROHRABACHER. Well I will tell you, when you are talking about "compassion," it is very difficult for me to get compassionate about a company that makes \$4 billion profit.

I hope in those other \$3 billion—and Joe does have a point over here. You have got some young entrepreneurs who are involved in renewables, and they are struggling to get in the market, and I am trying to say the marketing end of it has to be left to them, and they are going to have to struggle on their own, but I cannot then turn around and give \$40 million to General Electric and that

other foreign company that you were talking about and GE. We just cannot do that.

So, anyway—unless of course I am overridden by my Committee members who have their own thoughts about these things.

So I will then turn—I am sorry, I guess Tim had to leave for a vote.

Ms. Jackson Lee, why don't you proceed?

Ms. JACKSON LEE. Thank you very much, Mr. Chairman. I appreciate you holding this hearing.

Let me ask this. I am concerned about the positions on the High Energy Physics budget for fiscal 1997 and how much of that funding will the Large Hadron Collider Project of your CERN Laboratory receive for this account?

Dr. DECKER. My name is Jim Decker. I am the Deputy Director of the Office of Energy Research, the office that has responsibility for high-energy physics.

In the Fiscal Year—

Ms. JACKSON LEE. I thought Supercollider did at one time, but they saw differently.

Dr. DECKER. Yes.

In the Fiscal Year 1997 budget request we have requested \$15 million for research and development on the detectors for the large Hadron Collider.

Ms. JACKSON LEE. I want to ask you an opinion. We have talked a lot about partnershiping, or cost sharing, or whatever, and clearly with this we are cost sharing here with CERN, and certainly it is more cost effective than the Supercollider.

But do you think that we are going to get the same results and level of research?

Dr. DECKER. The Large Hadron Collider will not be as powerful a machine as the Superconducting Supercollider would have been. Nonetheless, it is a machine that will move the energy frontier in high-energy physics from where we are at Fermi Lab where we are working with one a one-tray electron volt proton beams, to about seven times that.

So it does provide a very substantial advance forward for the field to investigate those things that we can only hope to see at the higher energies.

Ms. JACKSON LEE. Do you think ultimately we have got to do much of the research that we would have had result from the Superconducting Supercollider?

Dr. DECKER. Yes. I think that to advance the field of high-energy physics and improve our understanding of matter and energy, that this energy frontier is something that somehow the United States must participate in that is necessary for the world high-energy physics community to explore that frontier.

We have about 500 or so U.S. physicists who have expressed an interest in doing experiments on the Large Hadron Collider once it is completed.

Ms. JACKSON LEE. Thank you.

Let me ask one overall question, and then I want to go to waste management.

In my opinion, I have really felt that the partnershiping, the public/private type of cost sharing has been beneficial, and much

of it in my judgment would not take place if it was not a partnership; that many companies would not invest as much in R&D if there was not a partnership.

I wonder, do you think I am on a single-minded type of venture in feeling that way? Or do you think that much of the research can be privatized?

Mr. ROMM. If I could comment on that, I think there are two elements to the answer.

Historically, if the Federal Government pulls out of an area the private sector also pulls out of the area, principally because the financial community which invests and supports high-risk R&D looks to figure out if an area has long-term promise.

If the top government experts do not think an area has long-term promise, and if Congress indicates that it does not think the area has long-term promise, the financial community goes elsewhere with its money.

The second point is: the Department does not just invest in any type of R&D. It invests in R&D that has societal benefits that are not captured in the marketplace.

So by definition, if the Department does not invest in it, by and large it will not get done.

More recently there has been a great shift away from basic and applied research by industry in response to international competition and corporate downsizing.

So by and large there is not much corporate R&D with a time horizon beyond five years, and that is I think the emphasis of most of the basic and applied research of the Department.

Ms. JACKSON LEE. Thank you.

Now the President's request provides over \$50 million more for environment restoration and waste management of nondefense sites, and my District happens to have their rightful, or wrongful share.

But the bulk of this increase occurred in waste management and nuclear materials and facilities' stabilization accounts.

Could you please explain the nature of the requirements in these accounts that necessitate an increase in funding?

Mr. ROHRBACHER. Mr. Baker will be next after this question.

Dr. FRANK. My name is Clyde Frank. I am Deputy Assistant Secretary for Technology Development in the Environmental Management Organization.

I think that fundamentally I am going to have to take that back and have it answered. It is really very complex. The alterations in budgets, the transfer of facilities between organizations over the last year or two has created budget alterations accordingly.

I think that the waste management budget, we keep producing waste hopefully at a decreasing rate. But we are still dealing with the storage problems associated with that.

So if I could take that for the record, I will ensure that it will be answered.

[The following information was received for the record:]

COMMITTEE: HOUSE SCIENCE
 DATE: MARCH 21, 1996
 WITNESS: JOSEPH VIVONA
 PAGE: 81, LINE 1845

ENVIRONMENTAL MANAGEMENT
 NON-DEFENSE FUNDING INCREASES

The Environmental Management program requested an increase for Energy Supply Research and Development activities of approximately \$33.6M for fiscal year 1997. The Environmental Management program has numerous requirements which warrant this increase, which is actually a combination of various increases as well as decreases. The following chart explains only the major increases in non-defense funding requirements from FY 1996 to FY 1997.

OFFICE	INCREASE AMOUNT (\$ in 000's)	EXPLANATION
Nuclear Material & Facility Stabilization	+\$12,782	Increase in surveillance and maintenance and stabilization/deactivation activities associated with the Energy Technology Engineering Center. Initiates disposition of hazardous materials at Oak Ridge. Completion of Spent Nuclear Fuel project to comply with Idaho National Environmental Laboratory (INEL) Agreement milestone.
Waste Management	+\$25,509	Initiates operation of the Sodium Processing Facility to treat 7,000 gallons of bulk sodium at Argonne National Lab-West. Continues line item project for rehabilitation of the Waste Management Building at Argonne-National Lab-East. At Princeton Plasma Physics Lab. completes construction storm water detention cell and disposes of low-level waste to support Tokamak Fusion Test Reactor tritium operations. Increases production of radioactive waste canisters, from 30 canisters in FY 96 to a full year's production of 120 canisters, at the West Valley Demonstration Project.

Waste Management (continued)		Provides full treatment and disposal of waste generated by Oak Ridge National Lab in support of special isotope production for Energy Research. These unique isotopes are used by the world medical community for cancer treatment. Increase for the Bethel Valley Liquid Low-Level Waste Collection and Transfer system as the project moves into the final construction phase. The upgrade is required by a Federal Facility Agreement to correct major system non-compliances. The system is necessary to support Energy Research efforts such as the unique isotope production described above. Process additional waste as a result of cleanup efforts at ETEC. Additional funding also required to meet Lawrence Berkeley Lab Site Treatment Plan requirements.
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Mr. ROHRBACHER. Yes. We will be submitting—if you do not have questions that you have been able to get out, we will be submitting questions to you and we would appreciate the answers in a timely manner.

So we are going to hold the record open for people who have other questions they would like to ask in writing.

Mr. BAKER of California, then Mr. Roemer.

Mr. BAKER of California. Thank you very much.

Mr. Hunter, if I can continue the Chairman's questioning a little, I want to get to exactly where he is on the bottom line, but I want to hope that we could find a different course for getting there.

The Lightwater Nuclear Reactor Program was basically research program, wasn't it?

Mr. HUNTER. Research and development. More development than I think research, although we have had to rely on our national laboratories to help contribute to the Advanced Lightwater Reactor Program.

Mr. BAKER of California. Exactly. That is where the research comes in. You are not marketing plants for big companies who are doing anything commercial?

Mr. HUNTER. Absolutely not. No.

Mr. BAKER of California. Okay. And this is where I would differ with my Chairman but want to get to the bottom line.

The lab expertise is needed. Just as in the defense secrets, we bring those things into the commercialization, if you will, whether it is energy, or transportation, or saving the environment. We need to get that out. And there are companies that can help us do it.

But we always come out to be Uncle Sugar instead of Uncle Smart. When we license and have royalty agreements, we do not get it back.

So here in this Lightwater Reactor, GE is selling a 1300-megawatt plant to Japan. Do we get our \$40 million back?

The answer is, no.

So why do we not improve the licensing and royalties in these agreements so that if we strike it rich, Uncle Sam is reimbursed?

If it goes out like windmills and soybean research and we do not get anything back, okay. We tried. We thought the objective was valid, and we failed. We have to eat those losses.

I do not understand how we could just keep pouring money in, and then when they succeed we do not get our research and development dollars back so that we can again put the money into research and development.

I would love to see a revolving fund so we would not get these kinds of questions each year on why are you spending so much money.

If we are ever going to have fusion energy, we are going to have to spend money, and it could be partly financed by the successes of the past, or by the defense secrets we have commercialized.

So is anyone in the Department working on this to see if we can recruit more than one percent of what we have put in?

Mr. HUNTER. Under our existing contracts for the Lightwater, Advanced Lightwater Program, we do have some opportunity in the event one of these reactors is built in the United States to recover some of the government's costs.

Mr. BAKER of California. It will not be built here. We have got a bunch of loonies that would rather split wood than atoms, if you can imagine anything more stupid than that.

So we are not going to build them here. They are going to be built in Japan, and in the Far East, and in the Middle East.

So who cares where they are built if it is our technology and the company is benefitting, why do we not get a return?

Are we going to continually be terminally stupid and have your budget for research and development cut because we cannot ask for a return when the returns are there?

Mr. KRIPOWICZ. Sir, in the Clean Coal Technology Program where we get two-thirds' cost sharing up front from industry in the first place, we also have in place for every one of the 45 projects a repayment plan so that if the technology is commercialized the government will receive back full payment of the amounts that they have put up for the technology.

Also, in certain other programs on a limited basis we do the same thing both in fossil energy and in energy efficiency. But the Clean Coal Program is one where we do have agreements with all of the companies for a payback.

Mr. BAKER of California. That sounds like a good example, and I do not think we should just limit it to the amount we put in, but if we were a 1 percent partner, maybe we could make money.

Remember Chrysler? They had 100,000 jobs they wanted to save but nobody would invest 10 cents in them. They had big, ugly cars that were nonenergy efficient and nobody wanted them.

We loaned them the money to save the jobs. What did we take back? Their "worthless" stock.

Do you know what we sold that for? We made a fortune on Chrysler's stock. Iacocca wanted to get it back free. Oh, you cannot sell that stock. You give it back to us.

We sold it on the market and made money. Why? Because our investment panned out. When it pans out, we would have money for research and development if we thought more like businessmen instead of welfarestatists.

So I encourage you. I want to encourage more research, not less. The way to do it is to get smart with our successes.

Secondly, if I can go back to mundane things like protecting my laboratory, Mr. Vivona—

[Laughter.]

Mr. BAKER of California. In your budget, page 2 on your Department of Energy short that you have given us, multiprogram energy lab facility support is reduced 15.3 percent.

I realize you are still formalizing or finalizing those numbers, but when would I be able to share with the lab employees in my district exactly what the numbers are going to be, and what kind of opportunities there are within the science areas of government for reprogramming these people and retraining?

I do not want a surprise where 800 people or 1,000 people are laid off.

Mr. VIVONA. We will submit it to the Committee within a week.

[The following information was received for the record:]

FY 1997 Congressional Budget Request

State Table

Hazel R. O'Leary
Secretary of Energy



Department of Energy

March 1996

Chief Financial
Officer

T2RP4C
20.30.59DEPARTMENT OF ENERGY
FY 1997 CONGRESSIONAL BUDGET
STATE TABLE
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PAGE 1

PAGE NUMBER	STATE SUMMARY	FY 1995 COMPARABLE	FY 1996 COMPARABLE	FY 1997 REQUEST
1	ALABAMA	26,890	22,661	21,659
2	ALASKA	8,431	5,377	5,464
3	AMERICAN SAMOA	249	143	217
4	ARIZONA	76,598	69,820	63,131
5	ARKANSAS	2,156	1,195	1,885
6	CALIFORNIA	1,674,990	1,598,609	1,538,060
10	COLORADO	1,227,224	1,107,546	1,132,130
13	CONNECTICUT	59,010	57,749	40,632
14	DELAWARE	8,135	7,718	7,990
15	DISTRICT OF COLUMBIA	2,043,228	2,289,176	1,875,668
21	FLORIDA	68,355	68,876	88,227
23	GEORGIA	14,613	13,473	8,138
24	GUAM	234	122	199
25	HAWAII	2,807	2,565	2,763
26	IDAH0	975,613	956,106	923,260
29	ILLINOIS	822,098	732,623	705,857
33	INDIANA	29,141	25,880	25,254
34	IOWA	40,750	33,806	34,253
35	KANSAS	7,027	6,065	6,199
36	KENTUCKY	83,908	74,577	55,111
37	LOUISIANA	184,405	226,740	144,090
38	MAINE	7,329	2,212	2,923
39	MARYLAND	237,918	255,240	503,120
41	MASSACHUSETTS	104,439	90,690	88,880
43	MICHIGAN	29,427	20,335	24,239
44	MINNESOTA	15,719	11,534	12,996
45	MISSISSIPPI	3,977	2,977	3,648
46	MISSOURI	378,770	422,640	393,491
48	MONTANA	75,658	82,015	79,318
49	NEBRASKA	17,873	9,309	9,308
50	NEVADA	515,935	445,652	450,376
52	NEW HAMPSHIRE	2,957	2,001	2,381
53	NEW JERSEY	178,002	110,946	118,798
55	NEW MEXICO	2,359,377	2,409,695	2,340,767
59	NEW YORK	716,924	690,636	697,507
62	NORTH CAROLINA	22,484	17,242	18,328
63	NORTH DAKOTA	24,746	21,714	20,385
64	NORTHERN MARIANA ISL	223	116	191
65	OHIO	686,422	667,429	685,884
67	OKLAHOMA	93,274	78,850	81,341
69	OREGON	1,500,134	1,674,920	1,736,407
70	PENNSYLVANIA	461,624	455,409	415,949
73	PUERTO RICO	694	402	532
74	RHODE ISLAND	3,657	2,982	3,350
75	SOUTH CAROLINA	1,761,880	1,491,399	1,315,536
77	SOUTH DAKOTA	28,003	27,300	25,665
78	TENNESSEE	1,538,992	1,415,705	1,338,059
82	TEXAS	390,377	403,390	393,064
84	TRUST TERRITORIES	130	65	0
85	UTAH	61,639	69,293	61,538
86	VERMONT	1,975	1,305	1,680
87	VIRGINIA	122,425	102,476	120,759
89	VIRGIN ISLANDS	249	124	200
90	WASHINGTON	3,262,331	3,114,677	3,073,382
94	WEST VIRGINIA	115,926	132,237	154,438
95	WISCONSIN	26,377	23,179	21,952
96	WYOMING	48,375	47,217	36,444
97	ALL OTHER (FOREIGN)	2,713	2,439	1,665
TOTAL DEPARTMENT OF ENERGY		22,154,817	21,606,579	20,914,688

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ALABAMA	FY 1995 COMPARABLE	FY 1996 COMPARABLE	FY 1997 REQUEST
ENERGY SUPPLY RESEARCH AND DEVELOPMENT ACTIVITIES			
Biological and Environmental Research			
Biological and Environmental Research.....	682	646	687
Magnetic Fusion			
Fusion Energy Research.....	546	215	115
Supporting Research and Technical Analysis			
Basic Energy Sciences.....	305	411	256
Computational & Technology Research.....	291	254	266
TOTAL Supporting Research and Technical Analysis.....	596	665	522
TOTAL ENERGY SUPPLY RESEARCH AND DEVELOPMENT ACTIVITIES.....	1,824	1,526	1,324
GENERAL SCIENCE AND RESEARCH ACTIVITIES			
High Energy Physics			
High Energy Physics.....	352	293	380
Nuclear Physics			
Nuclear Physics.....	80	80	80
TOTAL GENERAL SCIENCE AND RESEARCH ACTIVITIES.....	432	373	460
DEPARTMENTAL ADMINISTRATION			
Human Resources & Administration			
Program Direction - HR.....	99	99	99
TOTAL DEPARTMENTAL ADMINISTRATION.....	99	99	99
SOUTHEASTERN POWER ADMIN - OPERATION & MAINTENANCE			
Purchase Power and Wheeling			
Purchase Power and Wheeling.....	8,531	6,470	7,492
TOTAL SOUTHEASTERN POWER ADMIN. - OPERATION & MAINTENANCE.....	8,531	6,470	7,492
FOSSIL ENERGY RESEARCH AND DEVELOPMENT			
Coal Research and Development			
Advanced Clean/Efficient Power Systems.....	13,450	12,600	10,000
Oil, Gas, and Shale Research and Development			
Natural Gas Research.....	25	25	25
TOTAL FOSSIL ENERGY RESEARCH AND DEVELOPMENT.....	13,475	12,625	10,025
ENERGY CONSERVATION			
Building Technologies, State, & Community Sector			
Grants.....	2,529	1,568	2,259
TOTAL ENERGY CONSERVATION.....	2,529	1,568	2,259
TOTAL ALABAMA.....	26,890	22,661	21,659

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FY 1997 CONGRESSIONAL BUDGET
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ALASKA	FY 1995 COMPARABLE	FY 1996 COMPARABLE	FY 1997 REQUEST
ENERGY SUPPLY RESEARCH AND DEVELOPMENT ACTIVITIES			
Supporting Research and Technical Analysis			
Basic Energy Sciences.....	49	98	0
TOTAL ENERGY SUPPLY RESEARCH AND DEVELOPMENT ACTIVITIES	49	98	0
ALASKA POWER ADMINISTRATION - OPERATION & MAINTENANCE			
Operation and Maintenance			
APA - Operation and Maintenance...	3,404	1,052	0
Program Direction - AK.....	3,088	3,208	4,000
TOTAL Operation and Maintenance	6,492	4,260	4,000
TOTAL ALASKA POWER ADMINISTRATION - OPERATION & MAINTENANCE	6,492	4,260	4,000
ENERGY CONSERVATION			
Building Technologies, State, & Community Sector			
Grants.....	1,890	1,019	1,464
TOTAL ENERGY CONSERVATION	1,890	1,019	1,464
TOTAL ALASKA.....	8,431	5,377	5,464

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DEPARTMENT OF ENERGY
FY 1997 CONGRESSIONAL BUDGET
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AMERICAN SAMOA	FY 1995 COMPARABLE	FY 1996 COMPARABLE	FY 1997 REQUEST
DEPARTMENTAL ADMINISTRATION			
Human Resources & Administration			
Program Direction - HR	26	26	26
TOTAL DEPARTMENTAL ADMINISTRATION	26	26	26
ENERGY CONSERVATION			
Building Technologies, State, & Community Sector			
Grants	223	117	191
TOTAL ENERGY CONSERVATION	223	117	191
TOTAL AMERICAN SAMOA	249	143	217

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ARIZONA	FY 1995 COMPARABLE	FY 1996 COMPARABLE	FY 1997 REQUEST
ENERGY SUPPLY RESEARCH AND DEVELOPMENT ACTIVITIES			
Environmental Restoration and Waste Management			
Environmental Restoration.....	3,189	6,153	4,820
Biological and Environmental Research			
Biological and Environmental Research.....	1,565	1,212	464
Supporting Research and Technical Analysis			
Basic Energy Sciences.....	2,512	2,100	2,450
Computational & Technology Research.....	528	227	227
TOTAL Supporting Research and Technical Analysis.....	3,040	2,327	2,677
TOTAL ENERGY SUPPLY RESEARCH AND DEVELOPMENT ACTIVITIES.....	7,794	9,692	7,961
GENERAL SCIENCE AND RESEARCH ACTIVITIES			
High Energy Physics			
High Energy Physics.....	775	623	709
Nuclear Physics			
Nuclear Physics.....	164	169	173
TOTAL GENERAL SCIENCE AND RESEARCH ACTIVITIES.....	939	792	882
WESTERN AREA POWER ADMIN. CONST., REHAB., OPER. & MAINT.			
Systems Operation and Maintenance			
WAPA - Operation and Maintenance.....	32,767	18,840	15,568
Program Direction - WP			
Program Direction - WP.....	17,082	17,880	16,354
TOTAL WESTERN AREA POWER ADMIN. CONST., REHAB., OPER. & MAINT.....	49,849	36,720	31,922
COLORADO RIVER BASINS POWER MARKETING FUND (WAPA)			
Colorado River Storage Project			
Colorado River Basins Fund.....	13,954	19,162	18,326
Program Direction			
Program Direction.....	2,362	2,440	2,580
TOTAL COLORADO RIVER BASINS POWER MARKETING FUND (WAPA).....	16,316	21,602	20,906
ENERGY CONSERVATION			
Building Technologies, State, & Community Sector			
Grants.....	1,700	1,014	1,460
TOTAL ENERGY CONSERVATION.....	1,700	1,014	1,460
TOTAL ARIZONA.....	76,598	69,820	63,131

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DEPARTMENT OF ENERGY
FY 1997 CONGRESSIONAL BUDGET
STATE TABLE
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ARKANSAS	FY 1995 COMPARABLE	FY 1996 COMPARABLE	FY 1997 REQUEST
GENERAL SCIENCE AND RESEARCH ACTIVITIES			
Nuclear Physics			
Nuclear Physics.....	7	50	0
TOTAL GENERAL SCIENCE AND RESEARCH ACTIVITIES.....	7	50	0
ENERGY CONSERVATION			
Building Technologies, State, & Community Sector			
Grants.....	2.149	1.145	1.885
TOTAL ENERGY CONSERVATION.....	2.149	1.145	1.885
TOTAL ARKANSAS.....	2.156	1.195	1.885

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FY 1997 CONGRESSIONAL BUDGET
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CALIFORNIA

ENERGY SUPPLY RESEARCH AND DEVELOPMENT ACTIVITIES

	FY 1995 COMPARABLE	FY 1996 COMPARABLE	FY 1997 REQUEST
Solar and Renewable Energy			
Geothermal Energy R&D.....	8,100	0	0
Electric Energy Systems & Storage.....	300	300	200
Hydrogen Research R&D.....	1,100	1,100	1,000
TOTAL Solar and Renewable Energy.....	9,500	1,400	1,200
Nuclear Fission			
Light Water Reactors.....	38,030	19,800	22,300
Advanced Reactor R&D.....	7,589	0	0
Space Reactor Power Systems.....	555	0	0
Advanced Radioisotope Power Systems.....	5,130	3,500	4,135
Program Direction - NE.....	587	520	400
Termination Costs.....	0	5,800	3,250
Isotope Support.....	37	0	0
TOTAL Nuclear Fission.....	51,928	29,620	30,085
Environment, Safety and Health			
Environment, Safety and Health.....	9,571	8,582	7,883
Environmental Restoration and Waste Management			
Environmental Restoration.....	13,577	16,557	17,025
Waste Management.....	19,125	10,375	13,294
Site Operations.....	1,024	865	743
Nuclear Materials & Facilities Stabilization.....	0	2,888	16,146
TOTAL Environmental Restoration and Waste Management.....	33,726	30,685	47,208
Biological and Environmental Research			
Biological and Environmental Research.....	99,816	82,171	66,700
Magnetic Fusion			
Fusion Energy Research.....	91,637	70,842	71,389
Supporting Research and Technical Analysis			
Basic Energy Sciences.....	98,957	113,923	120,113
Energy Research Analyses.....	5	0	0
Computational & Technology Research.....	66,223	55,686	53,679
TOTAL Supporting Research and Technical Analysis.....	165,185	169,609	173,792
Multiprogram Facilities Support			
Multiprogram Energy Labs - Facilities Support.....	6,183	5,823	1,330
In-House Energy Management			
In-House Energy Management.....	7,214	0	0
Program Direction - ER			
Program Direction - ER.....	306	187	239
University & Science Education			
University & Science Education.....	7,901	1,536	1,650
Field Offices and Management			
Oakland Operations Office.....	24,828	24,489	23,249
TOTAL ENERGY SUPPLY RESEARCH AND DEVELOPMENT ACTIVITIES.....	507,795	424,944	424,725
URANIUM SUPPLY AND ENRICHMENT ACTIVITIES			
Uranium Supply and Enrichment Activities			
Uranium Supply and Enrichment Activities.....	8,493	8,320	14,655
Program Direction - NE.....	165	102	110
TOTAL Uranium Supply and Enrichment Activities.....	8,658	8,422	14,765
TOTAL URANIUM SUPPLY AND ENRICHMENT ACTIVITIES.....	8,658	8,422	14,765

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CALIFORNIA	FY 1995 COMPARABLE	FY 1996 COMPARABLE	FY 1997 REQUEST
GENERAL SCIENCE AND RESEARCH ACTIVITIES			
High Energy Physics			
High Energy Physics.....	206.783	214.819	215.092
Nuclear Physics			
Nuclear Physics.....	29.302	27.459	28.269
General Science Program Direction			
General Science Program Direction.....	809	664	725
TOTAL GENERAL SCIENCE AND RESEARCH ACTIVITIES.....	236.894	242.942	244.086
WEAPONS ACTIVITIES			
Program Direction			
Program Direction - DP.....	20.760	15.805	16.090
Stockpile Management			
Stockpile Management.....	30.770	35.366	44.969
Stockpile Stewardship			
Stockpile Stewardship.....	355.766	429.132	354.306*
TOTAL WEAPONS ACTIVITIES.....	407.296	480.303	415.365
DEFENSE ENVIRONMENTAL RESTORATION & WASTE MANAGEMENT			
Environmental Restoration			
Environmental Restoration.....	28.817	29.893	26.659
Waste Management			
Waste Management.....	44.135	48.022	34.104
Science and Technology			
Science and Technology.....	11.973	8.162	5.091
Site Operations			
Site Operations.....	1.528	1.060	1.055
Program Direction			
Program Direction - EM.....	9.482	10.346	9.385
Nuclear Materials & Facilities Stabilization			
Nuclear Materials & Facilities Stabilization.....	234	1.625	0
Policy and Management			
Policy and Management.....	263	203	265
TOTAL DEFENSE ENVIRONMENTAL RESTORATION & WASTE MANAGEMENT.....	96.432	99.311	76.559
OTHER DEFENSE ACTIVITIES			
Verification and Control Technology			
Arms Control.....	16.150	20.796	24.918
Intelligence.....	6.416	6.366	6.010
Nonproliferation & Verification R&D.....	39.152	39.742	37.980
TOTAL Verification and Control Technology.....	61.718	66.904	68.908
Nuclear Safeguards and Security			
Security Affairs.....	3.309	3.008	3.239
Security Investigations			
Security Investigations.....	4.700	5.702	3.700
Worker and Community Transition			
Worker and Community Transition.....	387	735	0

* The FY 1997 requests for the National Ignition Facility (NIF) and Accelerated Strategic Computing Initiative (ASCI) are currently included in the estimate for Washington headquarters, pending final site selection.

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CALIFORNIA	FY 1995 COMPARABLE	FY 1996 COMPARABLE	FY 1997 REQUEST
Fissile Materials Control & Disposition			
Fissile Materials Control & Disposition.....	7.160	9.940	13.300
Emergency Management			
Emergency Management.....	330	800	800
Environment, Safety, and Health			
Environment, Safety, and Health.....	1.361	1.295	1.328
TOTAL OTHER DEFENSE ACTIVITIES.....	78.965	88.384	91.275
DEPARTMENTAL ADMINISTRATION			
Office of Policy			
Environmental Policy Studies.....	450	296	0
Cost of Work for Others			
Cost of Work for Others.....	8.385	8.031	14.335
Human Resources & Administration			
Program Direction - HR.....	1.874	1.764	1.264
Economic Impact & Diversity			
Minority Economic Impact.....	225	403	400
TOTAL DEPARTMENTAL ADMINISTRATION.....	10.934	10.494	15.999
OFFICE OF THE INSPECTOR GENERAL			
Office of the Inspector General			
Office of Inspector General.....	1.537	1.297	1.224
TOTAL OFFICE OF THE INSPECTOR GENERAL.....	1.537	1.297	1.224
WESTERN AREA POWER ADMIN CONST, REHAB, OPER, & MAINT.			
Systems Operation and Maintenance			
WAPA - Operation and Maintenance.....	37.279	31.024	25.368
Program Direction - WP			
Program Direction - WP.....	12.526	13.679	11.993
TOTAL WESTERN AREA POWER ADMIN CONST, REHAB, OPER, & MAINT.....	49.805	44.703	37.361
FOSSIL ENERGY RESEARCH AND DEVELOPMENT			
Coal Research and Development			
Advanced Research and Tech. Development.....	399	383	380
Advanced Clean Fuels Research.....	1.400	825	500
Advanced Clean/Efficient Power Systems.....	1.648	3.395	774
TOTAL Coal Research and Development.....	3.447	4.603	1.654
Oil, Gas, and Shale Research and Development			
Natural Gas Research.....	8.017	453	450
Oil Technology.....	3.110	2.352	1.444
TOTAL Oil, Gas, and Shale Research and Development.....	11.127	2.805	1.894
TOTAL FOSSIL ENERGY RESEARCH AND DEVELOPMENT.....	14.574	7.408	3.548
NAVAL PETROLEUM AND OIL SHALE RESERVES			
Naval Petroleum and Oil Shale Reserves			
Naval Petroleum and Oil Shale Reserves.....	168.237	129.686	136.200
TOTAL NAVAL PETROLEUM AND OIL SHALE RESERVES.....	168.237	129.686	136.200

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CALIFORNIA

	FY 1995 COMPARABLE	FY 1996 COMPARABLE	FY 1997 REQUEST
ENERGY CONSERVATION			
Building Technologies, State, & Community Sector			
Research & Development.....	14,771	12,177	16,925
Grants.....	8,071	4,730	6,865
TOTAL Building Technologies, State, & Community Sector.....	22,842	16,907	23,790
Industrial Technologies			
Industry Sector.....	13,500	13,025	16,300
Transportation Technologies			
Transportation Sector.....	3,733	2,428	5,358
Utility Technologies			
Utility Sector.....	1,819	0	0
Policy and Management			
Policy and Management - EE.....	99	100	56
Federal Energy Management Program			
Federal Energy Management Program.....	1,893	1,535	1,605
TOTAL ENERGY CONSERVATION.....	43,886	33,995	47,109
NUCLEAR WASTE FUND			
Nuclear Waste Disposal Fund			
Nuclear Waste Fund.....	22,250	11,991	16,611
TOTAL NUCLEAR WASTE FUND.....	22,250	11,991	16,611
DEFENSE NUCLEAR WASTE DISPOSAL			
Defense Nuclear Waste Disposal			
Defense Nuclear Waste Disposal.....	19,685	8,106	9,921
TOTAL DEFENSE NUCLEAR WASTE DISPOSAL.....	19,685	8,106	9,921
ENERGY INFORMATION ADMINISTRATION			
Energy Information Administration			
National Energy Information System.....	8,042	6,623	3,312
TOTAL ENERGY INFORMATION ADMINISTRATION.....	8,042	6,623	3,312
TOTAL CALIFORNIA.....	1,674,990	1,598,609	1,538,060

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COLORADO

	FY 1995 COMPARABLE	FY 1996 COMPARABLE	FY 1997 REQUEST
ENERGY SUPPLY RESEARCH AND DEVELOPMENT ACTIVITIES			
Solar and Renewable Energy			
Solar Building Appliances R&D	2,893	875	1,900
Photovoltaic Systems R&D	64,800	46,150	68,746
Solar Thermal R&D	11,578	8,601	6,700
Biofuels	40,500	36,963	62,413
Wind Energy	38,579	25,192	40,650
Resource Assessment	3,279	1,690	0
National Renewable Energy Laboratory	5,963	2,000	5,000
Program Direction - EE	3,053	2,842	2,675
Geothermal Energy R&D	2,320	2,000	1,850
Electric Energy Systems & Storage	2,226	4,245	5,610
Hydrogen Research R&D	4,366	9,124	7,418
Renewable Energy Production Incentive Program	1,870	662	3,489
Solar and Renewable Energy Deployment	5,791	9,740	3,250
TOTAL Solar and Renewable Energy	187,218	150,084	209,701
Environmental Restoration and Waste Management			
Environmental Restoration	109,847	105,632	89,674
Biological and Environmental Research			
Biological and Environmental Research	7,099	4,925	3,971
Magnetic Fusion			
Fusion Energy Research	1,121	825	735
Supporting Research and Technical Analysis			
Basic Energy Sciences	6,184	5,838	5,798
Energy Research Analyses	89	0	0
Computational & Technology Research	2,218	1,899	1,419
TOTAL Supporting Research and Technical Analysis	8,491	7,737	7,217
In-House Energy Management			
In-House Energy Management	147	0	0
Program Direction - ER			
Program Direction - ER	25	0	0
University & Science Education			
University & Science Education	261	50	50
TOTAL ENERGY SUPPLY RESEARCH AND DEVELOPMENT ACTIVITIES	314,209	269,253	311,348
GENERAL SCIENCE AND RESEARCH ACTIVITIES			
High Energy Physics			
High Energy Physics	2,390	1,971	2,212
Nuclear Physics			
Nuclear Physics	967	819	853
TOTAL GENERAL SCIENCE AND RESEARCH ACTIVITIES	3,357	2,790	3,065
WEAPONS ACTIVITIES			
Stockpile Management			
Stockpile Management	51,590	46,000	48,000
Stockpile Stewardship			
Stockpile Stewardship	790	524	0
TOTAL WEAPONS ACTIVITIES	52,380	46,524	48,000

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COLORADO

	FY 1995 COMPARABLE	FY 1996 COMPARABLE	FY 1997 REQUEST
DEFENSE ENVIRONMENTAL RESTORATION & WASTE MANAGEMENT			
Environmental Restoration			
Environmental Restoration.....	566.581	532.864	504.322
Waste Management			
Waste Management.....	0	0	2.242
Science and Technology			
Science and Technology.....	6.467	2.595	1.539
Site Operations			
Site Operations.....	2.627	268	1.543
Program Direction			
Program Direction - EM.....	30.890	48.828	44.243
TOTAL DEFENSE ENVIRONMENTAL RESTORATION & WASTE MANAGEMENT.....	606.565	584.555	553.889
OTHER DEFENSE ACTIVITIES			
Security Investigations			
Security Investigations.....	1.200	316	900
Worker and Community Transition			
Worker and Community Transition.....	23.982	5.100	0
Fissile Materials Control & Disposition			
Fissile Materials Control & Disposition.....	0	55	0
TOTAL OTHER DEFENSE ACTIVITIES.....	25.182	5.471	900
DEPARTMENTAL ADMINISTRATION			
Cost of Work for Others			
Cost of Work for Others.....	100	100	0
Human Resources & Administration			
Program Direction - HR.....	833	833	833
Economic Impact & Diversity			
Minority Economic Impact.....	102	200	100
TOTAL DEPARTMENTAL ADMINISTRATION.....	1.035	1.133	933
OFFICE OF THE INSPECTOR GENERAL			
Office of the Inspector General			
Office of Inspector General.....	815	686	788
TOTAL OFFICE OF THE INSPECTOR GENERAL.....	815	686	788
WESTERN AREA POWER ADMIN. CONST., REHAB., OPER. & MAINT.			
Systems Operation and Maintenance			
WAPA - Operation and Maintenance.....	47.504	38.022	31.822
Program Direction - WP			
Program Direction - WP.....	49.305	50.972	46.882
TOTAL WESTERN AREA POWER ADMIN. CONST., REHAB., OPER. & MAINT.....	96.809	88.994	78.704
COLORADO RIVER BASINS POWER MARKETING FUND (WAPA)			
Colorado River Storage Project			
Colorado River Basins Fund.....	14.669	14.876	13.888
Program Direction			
Program Direction.....	16.007	16.537	17.484
TOTAL COLORADO RIVER BASINS POWER MARKETING FUND (WAPA).....	30.676	31.413	31.372

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COLORADO

	FY 1995 COMPARABLE	FY 1996 COMPARABLE	FY 1997 REQUEST
FOSSIL ENERGY RESEARCH AND DEVELOPMENT			
Coal Research and Development	223	116	115
Advanced Research and Tech. Development	1,394	1,553	1,000
Advanced Clean Fuels Research	150	0	0
Advanced Clean/Efficient Power Systems			
TOTAL Coal Research and Development	1,767	1,669	1,115
Oil, Gas, and Shale Research and Development	508	610	365
Natural Gas Research	90	130	130
Oil Technology			
TOTAL Oil, Gas, and Shale Research and Development	598	740	495
TOTAL FOSSIL ENERGY RESEARCH AND DEVELOPMENT	2,365	2,409	1,610
NAVAL PETROLEUM AND OIL SHALE RESERVES			
Naval Petroleum and Oil Shale Reserves	113	0	120
Naval Petroleum and Oil Shale Reserves			
TOTAL NAVAL PETROLEUM AND OIL SHALE RESERVES	113	0	120
ENERGY CONSERVATION			
Building Technologies, State, & Community Sector			
Research & Development	7,195	6,606	12,700
Grants	5,946	3,079	4,323
TOTAL Building Technologies, State, & Community Sector	13,141	9,685	17,023
Industrial Technologies			
Industry Sector	9,153	3,786	4,268
Transportation Technologies			
Transportation Sector	52,244	47,450	64,800
Utility Technologies			
Utility Sector	3,381	0	0
Policy and Management			
Policy and Management - EE	3,362	4,118	5,918
Federal Energy Management Program			
Federal Energy Management Program	10,150	7,335	7,740
TOTAL ENERGY CONSERVATION	91,431	72,374	99,749
ENERGY INFORMATION ADMINISTRATION			
Energy Information Administration			
National Energy Information System	2,287	1,944	1,652
TOTAL ENERGY INFORMATION ADMINISTRATION	2,287	1,944	1,652
TOTAL COLORADO	1,227,224	1,107,546	1,132,130

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CONNECTICUT

	FY 1995 COMPARABLE	FY 1996 COMPARABLE	FY 1997 REQUEST
ENERGY SUPPLY RESEARCH AND DEVELOPMENT ACTIVITIES			
Nuclear Fission			
Advanced Reactor R&D.....	850	0	0
Termination Costs.....	0	280	0
TOTAL Nuclear Fission.....	850	280	0
Environmental Restoration and Waste Management			
Environmental Restoration.....	79	454	694
Biological and Environmental Research			
Biological and Environmental Research.....	405	0	0
Magnetic Fusion			
Fusion Energy Research.....	326	0	10
Supporting Research and Technical Analysis			
Basic Energy Sciences.....	1,690	1,609	1,915
TOTAL ENERGY SUPPLY RESEARCH AND DEVELOPMENT ACTIVITIES.....	3,350	2,343	2,619
GENERAL SCIENCE AND RESEARCH ACTIVITIES			
High Energy Physics			
High Energy Physics.....	4,267	4,445	4,519
Nuclear Physics			
Nuclear Physics.....	4,505	4,096	4,053
TOTAL GENERAL SCIENCE AND RESEARCH ACTIVITIES.....	8,772	8,541	8,572
OTHER DEFENSE ACTIVITIES			
Naval Reactors			
Naval Reactors Development.....	27,000	18,700	21,500
TOTAL OTHER DEFENSE ACTIVITIES.....	27,000	18,700	21,500
DEPARTMENTAL ADMINISTRATION			
Human Resources & Administration			
Program Direction - HR.....	27	27	27
TOTAL DEPARTMENTAL ADMINISTRATION.....	27	27	27
FOSSIL ENERGY RESEARCH AND DEVELOPMENT			
Coal Research and Development			
Advanced Research and Tech. Development.....	0	200	0
Advanced Clean Fuels Research.....	484	0	0
Advanced Clean/Efficient Power Systems.....	2,141	8,075	5,369
TOTAL Coal Research and Development.....	2,625	8,275	5,369
Oil, Gas, and Shale Research and Development			
Natural Gas Research.....	103	0	0
Fuel Cells.....	14,326	18,227	250
TOTAL Oil, Gas, and Shale Research and Development.....	14,429	18,227	250
TOTAL FOSSIL ENERGY RESEARCH AND DEVELOPMENT.....	17,054	26,502	5,619
ENERGY CONSERVATION			
Building Technologies: State, & Community Sector			
Grants.....	2,807	1,636	2,295
TOTAL ENERGY CONSERVATION.....	2,807	1,636	2,295
TOTAL CONNECTICUT.....	59,010	57,749	40,632

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DELAWARE	FY 1995 COMPARABLE	FY 1996 COMPARABLE	FY 1997 REQUEST
ENERGY SUPPLY RESEARCH AND DEVELOPMENT ACTIVITIES			
Biological and Environmental Research			
Biological and Environmental Research.....	202	107	200
Supporting Research and Technical Analysis			
Basic Energy Sciences.....	646	654	682
Computational & Technology Research.....	39	39	39
TOTAL Supporting Research and Technical Analysis.....	685	693	721
TOTAL ENERGY SUPPLY RESEARCH AND DEVELOPMENT ACTIVITIES.....	887	800	921
GENERAL SCIENCE AND RESEARCH ACTIVITIES			
High Energy Physics			
High Energy Physics.....	477	495	437
TOTAL GENERAL SCIENCE AND RESEARCH ACTIVITIES.....	477	495	437
DEPARTMENTAL ADMINISTRATION			
Human Resources & Administration			
Program Direction - HR.....	5,974	5,974	5,974
TOTAL DEPARTMENTAL ADMINISTRATION.....	5,974	5,974	5,974
ENERGY CONSERVATION			
Building Technologies, State, & Community Sector			
Grants.....	797	449	658
TOTAL ENERGY CONSERVATION.....	797	449	658
TOTAL DELAWARE.....	8,135	7,718	7,990

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DISTRICT OF COLUMBIA

ENERGY SUPPLY RESEARCH AND DEVELOPMENT ACTIVITIES

Solar and Renewable Energy

	FY 1995 COMPARABLE	FY 1996 COMPARABLE	FY 1997 REQUEST
Solar Building Appliances R&D.....	1.456	1.067	3.100
Photovoltaic Systems R&D.....	4.385	5.759	6.248
Solar Thermal R&D.....	1.692	2.851	2.480
Biofuels.....	1.609	7.232	7.932
Wind Energy.....	2.972	3.209	5.850
Resource Assessment.....	527	252	0
Program Direction - EE.....	14.598	10.985	14.471
Geothermal Energy R&D.....	5.806	7.462	7.550
Electric Energy Systems & Storage.....	11.409	11.047	8.890
Hydrogen Research R&D.....	915	1,041	500
Renewable Energy Production Incentive Program.....	2.789	0	0
Solar and Renewable Energy Deployment.....	22.980	4.531	5.059

TOTAL Solar and Renewable Energy.....	71.138	55.436	62.080
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Nuclear Fission

Light Water Reactors.....	1.483	2.487	3.700
Advanced Reactor R&D.....	488	0	0
Space Reactor Power Systems.....	384	0	0
Advanced Radioisotope Power Systems.....	6.172	6.901	8.925
Facilities.....	43	0	0
Program Direction - NE.....	19.600	11.431	15.104
Termination Costs.....	412	2,891	2,150
Test Reactor Area Landlord.....	10	0	200
Advanced Test Reactor Fusion Irradiation.....	600	1,450	50
Isotope Support.....	2,416	4,883	4,454
University Reactor Fuel Assistance and Support.....	1,161	1,300	4,750
Program Direction - RW.....	110	0	0

TOTAL Nuclear Fission.....	32.879	31.343	39.333
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Environment, Safety and Health

Environment, Safety and Health.....	24.967	31.287	24.954
Program Direction - EH.....	45.113	39.315	39.046

TOTAL Environment, Safety and Health.....	70.080	70.602	64.000
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Environmental Restoration and Waste Management

Environmental Restoration.....	34.589	9.449	8.511
Waste Management.....	4.288	0	0

TOTAL Environmental Restoration and Waste Management.....	38.877	9.449	8.511
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Biological and Environmental Research

Biological and Environmental Research.....	8.411	62.633	73.764
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Magnetic Fusion

Fusion Energy Research.....	985	9.867	31.851
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Supporting Research and Technical Analysis

Basic Energy Sciences.....	13.534	74.685	73.907
Advanced Neutron Source.....	149	0	0
Energy Research Analyses.....	281	2,365	1,745
Computational & Technology Research.....	4.239	23.138	39.552

TOTAL Supporting Research and Technical Analysis.....	18.203	100.188	115.284
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Multiprogram Facilities Support

Multiprogram Energy Labs - Facilities Support.....	17	1.071	370
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Small Business Innovation Research

Small Business Innovation Research.....	72.439	0	0
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DISTRICT OF COLUMBIA	FY 1995 COMPARABLE	FY 1996 COMPARABLE	FY 1997 REQUEST
In-House Energy Management			
In-House Energy Management	736	342	4.700
Program Direction - ER			
Program Direction - ER	43.253	37.045	36.521
University & Science Education			
University & Science Education	708	2.455	4.700
Technology Partnerships			
Technology Partnerships	2.902	0	0
Informations Systems Investment			
Informations Systems Investment	0	0	14.900
Field Offices and Management			
Adjustment	14.046	8.316	12.802
TOTAL ENERGY SUPPLY RESEARCH AND DEVELOPMENT ACTIVITIES	374.674	388.747	468.736
URANIUM SUPPLY AND ENRICHMENT ACTIVITIES			
Uranium Supply and Enrichment Activities			
Uranium Supply and Enrichment Activities	174	621	2.142
Program Direction - NE	1.681	1.758	2.128
TOTAL Uranium Supply and Enrichment Activities	1.855	2.379	4.270
TOTAL URANIUM SUPPLY AND ENRICHMENT ACTIVITIES	1.855	2.379	4.270
URANIUM ENRICHMENT DECON. & DECOM FUND			
Uranium Enrichment D & D Fund			
UE Decontamination & Decommissioning Fund	41.700	42.000	42.000
TOTAL URANIUM ENRICHMENT DECON. & DECOM FUND	41.700	42.000	42.000
GENERAL SCIENCE AND RESEARCH ACTIVITIES			
High Energy Physics			
High Energy Physics	999	20.601	36.016
Nuclear Physics			
Nuclear Physics	590	12.308	14.997
General Science Program Direction			
General Science Program Direction	7.707	7.286	8.151
TOTAL GENERAL SCIENCE AND RESEARCH ACTIVITIES	9.296	40.195	59.164
WEAPONS ACTIVITIES			
Stockpile Stewardship			
Stockpile Stewardship	8.950	8.500	8.156
TOTAL WEAPONS ACTIVITIES	8.950	8.500	8.156
DEFENSE ENVIRONMENTAL RESTORATION & WASTE MANAGEMENT			
Environmental Restoration			
Environmental Restoration	183.101	370.228	385.455
Waste Management			
Waste Management	43.602	10.079	4.846
Site Operations			
Site Operations	34.850	21.871	24.815

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DISTRICT OF COLUMBIA	FY 1995 COMPARABLE	FY 1996 COMPARABLE	FY 1997 REQUEST
Program Direction			
Program Direction - EM.....	163.754	131.073	130.257
Nuclear Materials & Facilities Stabilization			
Nuclear Materials & Facilities Stabilization.....	1.077	6.413	2.394
Policy and Management			
Policy and Management.....	48.782	16.344	36.430
Environmental Management Science Program			
Environmental Management Science Program.....	22.650	62.575	52.136
TOTAL DEFENSE ENVIRONMENTAL RESTORATION & WASTE MANAGEMENT.....	497.816	618.583	636.333
OTHER DEFENSE ACTIVITIES			
Verification and Control Technology			
Arms Control.....	11.733	27.222	27.685
Intelligence.....	501	50	0
Nonproliferation & Verification R&D.....	11.692	2.731	10.674
TOTAL Verification and Control Technology.....	23.926	30.003	38.359
Security Investigations			
Security Investigations.....	4.140	1.191	3.340
Naval Reactors			
Naval Reactors Development.....	0	32	0
Program Direction - NE.....	7.888	9.998	9.032
TOTAL Naval Reactors.....	7.888	10.030	9.032
Worker and Community Transition			
Worker and Community Transition.....	0	36.532	62.659
Program Direction - WT.....	4.268	4.329	4.341
TOTAL Worker and Community Transition.....	4.268	40.861	67.000
Fissile Materials Control & Disposition			
Fissile Materials Control & Disposition.....	3.765	4.182	30.813
Program Direction - MD.....	1.426	3.582	3.633
TOTAL Fissile Materials Control & Disposition.....	5.191	7.764	34.446
Emergency Management			
Emergency Management.....	5.879	6.766	6.694
Environment, Safety, and Health			
Environment, Safety, and Health.....	46.036	45.617	40.407
Program Direction - EH.....	10.810	11.766	10.706
TOTAL Environment, Safety, and Health.....	56.846	57.383	51.113
Program Direction			
Program Direction - NN.....	41.878	41.258	49.034
International Nuclear Safety			
International Nuclear Safety.....	1.262	900	500
Nuclear Security			
Nuclear Security.....	0	0	1.000
TOTAL OTHER DEFENSE ACTIVITIES.....	151.278	196.156	260.518

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DISTRICT OF COLUMBIA	FY 1995 COMPARABLE	FY 1996 COMPARABLE	FY 1997 REQUEST
DEPARTMENTAL ADMINISTRATION			
Office of Policy			
Policy Analysis & Systems Studies	3,505	2,900	3,493
Program Direction - PO	19,004	18,354	20,201
Environmental Policy Studies	3,642	2,400	4,928
TOTAL Office of Policy	26,151	23,654	28,622
Chief Financial Officer			
Office of Chief Financial Officer	25,828	24,192	26,137
Congressional, Public, and Intergovernmental Affairs			
Public Affairs	54	50	65
Program Direction - CP	11,371	10,039	11,124
Consumer Affairs	46	40	40
TOTAL Congressional, Public, and Intergovernmental Affairs	11,471	10,129	11,229
General Counsel			
General Counsel	18,165	18,877	20,837
Office of the Secretary			
Office of the Secretary	3,416	3,352	2,850
Board of Contract Appeals			
Board of Contract Appeals	763	569	578
Cost of Work for Others			
Cost of Work for Others	2,000	2,000	0
Human Resources & Administration			
Program Direction - HR	64,163	63,863	59,926
Economic Impact & Diversity			
Program Direction - ED	4,925	4,364	4,836
Minority Economic Impact	1,118	1,673	1,726
TOTAL Economic Impact & Diversity	6,043	6,037	6,562
TOTAL DEPARTMENTAL ADMINISTRATION	158,000	152,673	156,741
OFFICE OF THE INSPECTOR GENERAL			
Office of the Inspector General			
Office of Inspector General	10,682	10,233	10,781
TOTAL OFFICE OF THE INSPECTOR GENERAL	10,682	10,233	10,781
BONNEVILLE POWER ADMINISTRATION FUND			
Bonneville Power Administration			
Bonneville Power Administration	634	739	703
TOTAL BONNEVILLE POWER ADMINISTRATION FUND	634	739	703
FEDERAL ENERGY REGULATORY COMMISSION			
Hydropower Regulation			
Hydropower Regulation	57,531	55,751	55,789
Electric Power Regulation			
Electric Power Regulation	35,639	33,451	33,473
Natural Gas and Oil Regulation			
Natural Gas and Oil Regulation	73,003	70,088	70,135
TOTAL FEDERAL ENERGY REGULATORY COMMISSION	166,173	159,290	159,397

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DISTRICT OF COLUMBIA	FY 1995 COMPARABLE	FY 1996 COMPARABLE	FY 1997 REQUEST
FOSSIL ENERGY RESEARCH AND DEVELOPMENT			
Coal Research and Development			
Advanced Research and Tech. Development.....	1,573	1,981	3,153
Advanced Clean/Efficient Power Systems.....	1,164	2,526	861
TOTAL Coal Research and Development.....	2,737	4,507	4,014
Oil, Gas, and Shale Research and Development			
Natural Gas Research.....	14,133	36,160	34,573
Environmental Restoration			
Environmental Restoration - FE.....	3,434	990	604
Cooperative R&D Ventures			
Cooperative R&D.....	733	0	0
Fuels Conversion (Natural Gas and Electricity)			
Fuels Conversion, Natural Gas and Electricity.....	2,395	2,300	1,888
Plant & Capital Equipment			
Plant - FE.....	0	2,304	2,304
Capital Equipment - FE.....	300	1,701	1,000
TOTAL Plant & Capital Equipment.....	300	4,005	3,304
TOTAL FOSSIL ENERGY RESEARCH AND DEVELOPMENT.....	23,732	47,962	44,383
CLEAN COAL TECHNOLOGY			
Clean Coal Technology			
Clean Coal Technology.....	36,276	150,000	-500,000
TOTAL CLEAN COAL TECHNOLOGY.....	36,276	150,000	-500,000
NAVAL PETROLEUM AND OIL SHALE RESERVES			
Naval Petroleum and Oil Shale Reserves			
Naval Petroleum and Oil Shale Reserves.....	2,385	2,300	2,300
TOTAL NAVAL PETROLEUM AND OIL SHALE RESERVES.....	2,385	2,300	2,300
ENERGY CONSERVATION			
Building Technologies, State, & Community Sector			
Research & Development.....	42,690	33,990	62,506
Grants.....	33,728	2,169	2,698
TOTAL Building Technologies, State, & Community Sector.....	76,418	36,159	65,204
Industrial Technologies			
Industry Sector.....	50,654	31,788	81,799
Transportation Technologies			
Transportation Sector.....	34,933	41,636	49,675
Policy and Management			
Policy and Management - EE.....	29,895	22,776	20,297
Federal Energy Management Program			
Federal Energy Management Program.....	3,274	5,664	17,750
TOTAL ENERGY CONSERVATION.....	195,174	138,023	234,725
NUCLEAR WASTE FUND			
Nuclear Waste Disposal Fund			
Nuclear Waste Fund.....	193,122	41,444	56,900
Program Direction - RW.....	26,233	28,549	29,740
TOTAL Nuclear Waste Disposal Fund.....	219,355	69,993	86,640
TOTAL NUCLEAR WASTE FUND.....	219,355	69,993	86,640

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DISTRICT OF COLUMBIA	FY 1995 COMPARABLE	FY 1996 COMPARABLE	FY 1997 REQUEST
DEFENSE NUCLEAR WASTE DISPOSAL			
Defense Nuclear Waste Disposal			
Defense Nuclear Waste Disposal	74.633	200.519	141.397
TOTAL DEFENSE NUCLEAR WASTE DISPOSAL	74.633	200.519	141.397
ECONOMIC REGULATION			
Economic Regulation			
Compliance	5.177	3.512	0
Hearings and Appeals			
Office of Hearings and Appeals	6.719	2.672	2.725
TOTAL ECONOMIC REGULATION	11.896	6.184	2.725
STRATEGIC PETROLEUM RESERVE			
SPR - Facilities Development			
SPR - Facilities Development	5.209	5.679	5.234
TOTAL STRATEGIC PETROLEUM RESERVE	5.209	5.679	5.234
STRATEGIC PETROLEUM RESERVE - PETROLEUM ACCOUNT			
SPR - Petroleum Account			
SPR - Petroleum Account	500	500	500
TOTAL STRATEGIC PETROLEUM RESERVE - PETROLEUM ACCOUNT	500	500	500
ENERGY INFORMATION ADMINISTRATION			
Energy Information Administration			
National Energy Information System	50.495	46.006	48.450
TOTAL ENERGY INFORMATION ADMINISTRATION	50.495	46.006	48.450
PAYMENTS TO STATES			
Payments to States			
Payments to States	2.515	2.515	2.515
TOTAL PAYMENTS TO STATES	2.515	2.515	2.515
TOTAL DISTRICT OF COLUMBIA	2,043,228	2,289,176	1,875,668

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FLORIDA

	FY 1995 COMPARABLE	FY 1996 COMPARABLE	FY 1997 REQUEST
ENERGY SUPPLY RESEARCH AND DEVELOPMENT ACTIVITIES			
Biological and Environmental Research			
Biological and Environmental Research.....	2.740	1.408	967
Magnetic Fusion			
Fusion Energy Research.....	42	30	40
Supporting Research and Technical Analysis			
Basic Energy Sciences.....	1,695	1,143	1,244
Energy Research Analyses.....	252	255	255
Computational & Technology Research.....	1,952	2,102	2,101
TOTAL Supporting Research and Technical Analysis.....	3,899	3,500	3,600
TOTAL ENERGY SUPPLY RESEARCH AND DEVELOPMENT ACTIVITIES.....	6.681	4.938	4.607
GENERAL SCIENCE AND RESEARCH ACTIVITIES			
High Energy Physics			
High Energy Physics.....	2.526	1.875	2.151
Nuclear Physics			
Nuclear Physics.....	381	288	383
TOTAL GENERAL SCIENCE AND RESEARCH ACTIVITIES.....	2.907	2.163	2.534
WEAPONS ACTIVITIES			
Stockpile Management			
Stockpile Management.....	4.595	6.680	18.267
Stockpile Stewardship			
Stockpile Stewardship.....	557	0	0
TOTAL WEAPONS ACTIVITIES.....	5.152	6.680	18.267
DEFENSE ENVIRONMENTAL RESTORATION & WASTE MANAGEMENT			
Site Operations			
Site Operations.....	43.217	52.490	59.065
TOTAL DEFENSE ENVIRONMENTAL RESTORATION & WASTE MANAGEMENT.....	43.217	52.490	59.065
DEPARTMENTAL ADMINISTRATION			
Human Resources & Administration			
Program Direction - HR.....	22	22	22
TOTAL DEPARTMENTAL ADMINISTRATION.....	22	22	22
SOUTHEASTERN POWER ADMIN. - OPERATION & MAINTENANCE			
Purchase Power and Wheeling			
Purchase Power and Wheeling.....	784	763	786
TOTAL SOUTHEASTERN POWER ADMIN. - OPERATION & MAINTENANCE.....	784	763	786
FOSSIL ENERGY RESEARCH AND DEVELOPMENT			
Coal Research and Development			
Advanced Research and Tech Development.....	100	0	0
Oil, Gas, and Shale Research and Development			
Natural Gas Research.....	6,564	0	0
Oil Technology.....	410	0	300
TOTAL Oil, Gas, and Shale Research and Development.....	6,974	0	300
TOTAL FOSSIL ENERGY RESEARCH AND DEVELOPMENT.....	7,074	0	300

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FLORIDA	FY 1995 COMPARABLE	FY 1996 COMPARABLE	FY 1997 REQUEST
ENERGY CONSERVATION			
Building Technologies, State, & Community Sector			
Grants.....	2,518	1,820	2,646
TOTAL ENERGY CONSERVATION.....	2,518	1,820	2,646
TOTAL FLORIDA.....	68,355	68,876	88,227

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GEORGIA

	FY 1995 COMPARABLE	FY 1996 COMPARABLE	FY 1997 REQUEST
ENERGY SUPPLY RESEARCH AND DEVELOPMENT ACTIVITIES			
Solar and Renewable Energy			
Biofuels	450	0	0
Resource Assessment	7	0	0
Geothermal Energy R&D	0	15	0
Electric Energy Systems & Storage	0	0	50
TOTAL Solar and Renewable Energy	457	15	50
Biological and Environmental Research	576	1,513	569
Magnetic Fusion			
Fusion Energy Research	250	150	0
Supporting Research and Technical Analysis			
Basic Energy Sciences	4,367	3,333	3,897
Computational & Technology Research	143	142	142
TOTAL Supporting Research and Technical Analysis	4,510	3,475	4,039
TOTAL ENERGY SUPPLY RESEARCH AND DEVELOPMENT ACTIVITIES	5,793	5,153	4,658
GENERAL SCIENCE AND RESEARCH ACTIVITIES			
High Energy Physics			
High Energy Physics	0	0	23
Nuclear Physics			
Nuclear Physics	225	286	199
TOTAL GENERAL SCIENCE AND RESEARCH ACTIVITIES	225	286	222
DEPARTMENTAL ADMINISTRATION			
Human Resources & Administration			
Program Direction - HR	786	786	786
TOTAL DEPARTMENTAL ADMINISTRATION	786	786	786
SOUTHEASTERN POWER ADMIN - OPERATION & MAINTENANCE			
Purchase Power and Wheeling			
Purchase Power and Wheeling	398	1,721	-4,431
Program Direction			
Program Direction - SE	3,284	3,472	3,989
TOTAL SOUTHEASTERN POWER ADMIN - OPERATION & MAINTENANCE	3,682	5,193	-442
SOUTHEASTERN POWER ADMINISTRATION - CONTINUING FUND			
Continuing Fund			
SEPA - Continuing Fund	50	50	50
TOTAL SOUTHEASTERN POWER ADMINISTRATION - CONTINUING FUND	50	50	50
ENERGY CONSERVATION			
Building Technologies, State, & Community Sector			
Grants	3,049	1,968	2,829
Transportation Technologies			
Transportation Sector	1,022	0	0
Federal Energy Management Program			
Federal Energy Management Program	6	37	35
TOTAL ENERGY CONSERVATION	4,077	2,005	2,864
TOTAL GEORGIA	14,613	13,473	8,138

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GUAM	FY 1995 COMPARABLE	FY 1996 COMPARABLE	FY 1997 REQUEST
ENERGY CONSERVATION			
Building Technologies, State, & Community Sector			
Grants.....	234	122	199
TOTAL ENERGY CONSERVATION.....	234	122	199
TOTAL GUAM.....	234	122	199

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HAWAII

	FY 1995 COMPARABLE	FY 1996 COMPARABLE	FY 1997 REQUEST
ENERGY SUPPLY RESEARCH AND DEVELOPMENT ACTIVITIES			
Biological and Environmental Research			
Biological and Environmental Research.....	256	175	81
Supporting Research and Technical Analysis			
Basic Energy Sciences.....	81	174	187
TOTAL ENERGY SUPPLY RESEARCH AND DEVELOPMENT ACTIVITIES.....	337	349	268
GENERAL SCIENCE AND RESEARCH ACTIVITIES			
High Energy Physics			
High Energy Physics.....	1.973	1.945	2.082
TOTAL GENERAL SCIENCE AND RESEARCH ACTIVITIES.....	1.973	1.945	2.082
ENERGY CONSERVATION			
Building Technologies, State, & Community Sector			
Grants.....	497	271	413
TOTAL ENERGY CONSERVATION.....	497	271	413
TOTAL HAWAII.....	2.807	2.565	2.763

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IDAHO

	FY 1995 COMPARABLE	FY 1996 COMPARABLE	FY 1997 REQUEST
ENERGY SUPPLY RESEARCH AND DEVELOPMENT ACTIVITIES			
Solar and Renewable Energy			
Program Direction - EE	141	148	155
Geothermal Energy R&D	15,358	15,540	17,575
TOTAL Solar and Renewable Energy	15,499	15,688	17,730
Nuclear Fission			
Light Water Reactors	590	123	500
Advanced Reactor R&D	60	0	0
Space Reactor Power Systems	125	0	0
Facilities	6,970	0	0
Nuclear Technology Research & Development	20,559	0	0
Program Direction - NE	183	105	110
Civilian Radioactive Waste R&D	279	0	0
Termination Costs	65,091	66,375	69,400
Test Reactor Area Landlord	3,941	3,900	3,800
Advanced Test Reactor Fusion Irradiation	1,740	853	750
Isotope Support	1,960	600	2,000
University Reactor Fuel Assistance and Support	2,344	2,200	2,200
TOTAL Nuclear Fission	103,842	74,156	78,760
Environment, Safety and Health			
Environment, Safety and Health	6,258	5,876	5,469
Environmental Restoration and Waste Management			
Environmental Restoration	809	968	1,718
Waste Management	9,020	5,719	10,228
Site Operations	0	712	0
Nuclear Materials & Facilities Stabilization	5,476	12,481	13,043
TOTAL Environmental Restoration and Waste Management	15,305	19,880	24,989
Biological and Environmental Research			
Biological and Environmental Research	3,340	2,326	2,445
Magnetic Fusion			
Fusion Energy Research	3,223	2,732	2,323
Supporting Research and Technical Analysis			
Basic Energy Sciences	3,660	3,024	3,138
Computational & Technology Research	510	95	0
TOTAL Supporting Research and Technical Analysis	4,170	3,119	3,138
In-House Energy Management			
In-House Energy Management	676	0	0
University & Science Education			
University & Science Education	395	120	150
Field Offices and Management			
Idaho Operations Office	23,214	20,006	21,911
TOTAL ENERGY SUPPLY RESEARCH AND DEVELOPMENT ACTIVITIES	175,922	143,903	156,915
URANIUM SUPPLY AND ENRICHMENT ACTIVITIES			
Uranium Supply and Enrichment Activities			
Program Direction - NE	29	0	0
TOTAL URANIUM SUPPLY AND ENRICHMENT ACTIVITIES	29	0	0

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IDAHO	FY 1995 COMPARABLE	FY 1996 COMPARABLE	FY 1997 REQUEST
GENERAL SCIENCE AND RESEARCH ACTIVITIES			
Nuclear Physics			
Nuclear Physics.....	0	0	100
TOTAL GENERAL SCIENCE AND RESEARCH ACTIVITIES.....	0	0	100
WEAPONS ACTIVITIES			
Program Direction			
Program Direction - DP.....	2,774	1,575	1,690
Stockpile Management			
Stockpile Management	9,034	12,538	11,420
Stockpile Stewardship			
Stockpile Stewardship	267	456	0
TOTAL WEAPONS ACTIVITIES.....	12,075	14,569	13,110
DEFENSE ENVIRONMENTAL RESTORATION & WASTE MANAGEMENT			
Environmental Restoration			
Environmental Restoration.....	105,009	93,965	109,259
Waste Management			
Waste Management.....	155,512	163,814	110,782
Science and Technology			
Science and Technology	47,727	51,972	70,760
Site Operations			
Site Operations.....	44,888	38,394	33,554
Program Direction			
Program Direction - EM.....	30,961	28,992	27,409
Nuclear Materials & Facilities Stabilization			
Nuclear Materials & Facilities Stabilization	139,100	129,856	137,555
Policy and Management			
Policy and Management	0	1,000	1,300
TOTAL DEFENSE ENVIRONMENTAL RESTORATION & WASTE MANAGEMENT.....	523,197	507,993	490,619
OTHER DEFENSE ACTIVITIES			
Verification and Control Technology			
Arms Control.....	181	0	0
Intelligence.....	1,278	1,325	1,245
Nonproliferation & Verification R&D	3,986	4,962	2,700
TOTAL Verification and Control Technology	5,445	6,287	3,945
Nuclear Safeguards and Security			
Security Affairs.....	827	827	827
Security Investigations			
Security Investigations	896	630	400
Naval Reactors			
Naval Reactors Development	100,170	113,270	104,200
Worker and Community Transition			
Worker and Community Transition	325	5,000	0
Fissile Materials Control & Disposition			
Fissile Materials Control & Disposition	735	950	0

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10AHO	FY 1995 COMPARABLE	FY 1996 COMPARABLE	FY 1997 REQUEST
Emergency Management			
Emergency Management.....	260	200	200
Environment, Safety, and Health			
Environment, Safety, and Health.....	423	160	160
TOTAL OTHER DEFENSE ACTIVITIES.....	109.081	127.324	109.732
DEPARTMENTAL ADMINISTRATION			
Cost of Work for Others			
Cost of Work for Others.....	1.255	281	281
Human Resources & Administration			
Program Direction - HR.....	750	575	575
TOTAL DEPARTMENTAL ADMINISTRATION.....	2.005	856	856
OFFICE OF THE INSPECTOR GENERAL			
Office of the Inspector General			
Office of Inspector General.....	816	686	788
TOTAL OFFICE OF THE INSPECTOR GENERAL.....	816	686	788
BONNEVILLE POWER ADMINISTRATION FUND			
Bonneville Power Administration			
Bonneville Power Administration.....	135.383	153.950	146.370
TOTAL BONNEVILLE POWER ADMINISTRATION FUND.....	135.383	153.950	146.370
FOSSIL ENERGY RESEARCH AND DEVELOPMENT			
Coal Research and Development			
Advanced Research and Tech. Development.....	1.040	627	325
Oil, Gas, and Shale Research and Development			
Natural Gas Research.....	290	350	300
Oil Technology.....	327	350	250
TOTAL Oil, Gas, and Shale Research and Development.....	617	700	550
TOTAL FOSSIL ENERGY RESEARCH AND DEVELOPMENT.....	1.657	1.327	875
ENERGY CONSERVATION			
Building Technologies, State, & Community Sector			
Grants.....	2.149	1.160	1.655
Industrial Technologies			
Industry Sector.....	5.350	1.730	460
Transportation Technologies			
Transportation Sector.....	4.734	2.275	1.775
Federal Energy Management Program			
Federal Energy Management Program.....	5	5	5
TOTAL ENERGY CONSERVATION.....	12.238	5.170	3.895
NUCLEAR WASTE FUND			
Nuclear Waste Disposal Fund			
Nuclear Waste Fund.....	2.951	60	0
Program Direction - RW.....	259	268	0
TOTAL Nuclear Waste Disposal Fund.....	3.210	328	0
TOTAL NUCLEAR WASTE FUND.....	3.210	328	0
TOTAL IDAHO.....	975.613	956.106	923.260

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ILLINOIS

	FY 1995 COMPARABLE	FY 1996 COMPARABLE	FY 1997 REQUEST
ENERGY SUPPLY RESEARCH AND DEVELOPMENT ACTIVITIES			
Solar and Renewable Energy			
Solar Thermal R&D	4	0	0
Biofuels	931	565	275
Electric Energy Systems & Storage	4,225	3,350	3,810
TOTAL Solar and Renewable Energy	5,160	3,915	4,085
Nuclear Fission			
Light Water Reactors	1,260	1,377	500
Advanced Reactor R&D	8,700	0	0
Space Reactor Power Systems	25	0	0
Nuclear Technology Research & Development	0	25,000	30,000
Program Direction - NE	1,811	1,245	1,180
Termination Costs	2,600	2,600	1,800
TOTAL Nuclear Fission	14,396	30,222	33,480
Environment, Safety and Health			
Environment, Safety and Health	3,463	3,024	2,687
Environmental Restoration and Waste Management			
Environmental Restoration	13,060	8,177	11,150
Waste Management	21,145	11,033	13,294
Site Operations	110	1,676	793
TOTAL Environmental Restoration and Waste Management	34,315	20,886	25,237
Biological and Environmental Research			
Biological and Environmental Research	23,790	20,594	13,901
Magnetic Fusion			
Fusion Energy Research	8,008	5,045	4,170
Supporting Research and Technical Analysis			
Basic Energy Sciences	189,022	156,791	152,998
Advanced Neutron Source	-200	0	0
Energy Research Analyses	300	150	0
Computational & Technology Research	20,998	13,247	11,867
TOTAL Supporting Research and Technical Analysis	210,120	170,188	164,865
Multiprogram Facilities Support			
Multiprogram Energy Labs - Facilities Support	6,371	8,622	6,198
In-House Energy Management			
In-House Energy Management	3,601	0	0
Program Direction - ER			
Program Direction - ER	7,208	6,472	5,394
University & Science Education			
University & Science Education	21,240	3,915	3,050
Field Offices and Management			
Chicago Operations Office	28,170	26,574	27,277
TOTAL ENERGY SUPPLY RESEARCH AND DEVELOPMENT ACTIVITIES	365,842	299,457	290,344
URANIUM SUPPLY AND ENRICHMENT ACTIVITIES			
Uranium Supply and Enrichment Activities			
Uranium Supply and Enrichment Activities	1,380	3,250	2,160
Program Direction - NE	68	250	700
TOTAL Uranium Supply and Enrichment Activities	1,448	3,500	2,860
TOTAL URANIUM SUPPLY AND ENRICHMENT ACTIVITIES	1,448	3,500	2,860

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ILLINOIS	FY 1995 COMPARABLE	FY 1996 COMPARABLE	FY 1997 REQUEST
GENERAL SCIENCE AND RESEARCH ACTIVITIES			
High Energy Physics			
High Energy Physics.....	262.302	269.569	272.773
Nuclear Physics			
Nuclear Physics.....	16.156	16.021	16.737
General Science Program Direction			
General Science Program Direction.....	1.905	1.826	1.880
TOTAL GENERAL SCIENCE AND RESEARCH ACTIVITIES.....	280.363	287.416	291.390
WEAPONS ACTIVITIES			
Program Direction			
Program Direction - DP.....	3.337	2.550	2.113
Stockpile Management			
Stockpile Management.....	19.757	140	156
Stockpile Stewardship			
Stockpile Stewardship.....	1.380	1.200	0
TOTAL WEAPONS ACTIVITIES.....	24.474	3.890	2.269
DEFENSE ENVIRONMENTAL RESTORATION & WASTE MANAGEMENT			
Environmental Restoration			
Environmental Restoration.....	2.224	1.233	903
Science and Technology			
Science and Technology.....	6.123	9.216	9.082
Site Operations			
Site Operations.....	3.033	100	1.070
Program Direction			
Program Direction - EM.....	12.927	9.201	8.550
Nuclear Materials & Facilities Stabilization			
Nuclear Materials & Facilities Stabilization.....	0	56	0
Policy and Management			
Policy and Management.....	0	300	400
TOTAL DEFENSE ENVIRONMENTAL RESTORATION & WASTE MANAGEMENT.....	24.307	20.106	20.005
OTHER DEFENSE ACTIVITIES			
Verification and Control Technology			
Arms Control.....	3.865	6.304	9.765
Intelligence.....	315	328	300
Nonproliferation & Verification R&D.....	2.699	2.188	1.950
TOTAL Verification and Control Technology.....	6.879	8.820	12.015
Nuclear Safeguards and Security			
Security Affairs.....	447	439	183
Security Investigations			
Security Investigations.....	300	0	200
Fissile Materials Control & Disposition			
Fissile Materials Control & Disposition.....	8.944	7.425	2.000
Emergency Management			
Emergency Management.....	15	0	0

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ILLINOIS	FY 1995 COMPARABLE	FY 1996 COMPARABLE	FY 1997 REQUEST
Environment, Safety, and Health Environment, Safety, and Health.....	1.467	1.430	1.467
Program Direction Program Direction - NN.....	5.827	5.845	5.305
International Nuclear Safety International Nuclear Safety.....	3.838	2.100	4.300
TOTAL OTHER DEFENSE ACTIVITIES.....	27.717	26.059	25.470
DEPARTMENTAL ADMINISTRATION			
Office of Policy Environmental Policy Studies.....	1.004	662	0
Cost of Work for Others Cost of Work for Others.....	150	415	1.395
Human Resources & Administration Program Direction - HR.....	935	882	882
Economic Impact & Diversity Minority Economic Impact.....	855	480	480
TOTAL DEPARTMENTAL ADMINISTRATION.....	2.944	2.439	2.757
OFFICE OF THE INSPECTOR GENERAL			
Office of the Inspector General Office of Inspector General.....	723	457	526
TOTAL OFFICE OF THE INSPECTOR GENERAL.....	723	457	526
FOSSIL ENERGY RESEARCH AND DEVELOPMENT			
Coal Research and Development Advanced Research and Tech. Development.....	1.143	1.390	1.145
Advanced Clean/Efficient Power Systems.....	600	306	767
TOTAL Coal Research and Development.....	1.743	1.696	1.912
Oil, Gas, and Shale Research and Development Natural Gas Research.....	1.273	1.691	1.205
Fuel Cells.....	14.787	19.321	920
Oil Technology.....	100	400	500
TOTAL Oil, Gas, and Shale Research and Development.....	16.160	21.412	2.625
Cooperative R&D Ventures Cooperative R&D.....	497	0	0
Fuels Conversion (Natural Gas and Electricity) Fuels Conversion, Natural Gas and Electricity.....	600	387	300
TOTAL FOSSIL ENERGY RESEARCH AND DEVELOPMENT.....	19.000	23.495	4.837
ENERGY CONSERVATION			
Building Technologies, State, & Community Sector Research & Development.....	125	175	250
Grants.....	13.649	7.977	11.134
TOTAL Building Technologies, State, & Community Sector.....	13.774	8.152	11.384
Industrial Technologies Industry Sector.....	8.514	15.130	4.867

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ILLINOIS	FY 1995 COMPARABLE	FY 1996 COMPARABLE	FY 1997 REQUEST
Transportation Technologies			
Transportation Sector.....	47,082	41,715	48,295
Utility Technologies			
Utility Sector.....	1,822	0	0
Policy and Management			
Policy and Management - EE	396	102	102
Federal Energy Management Program			
Federal Energy Management Program.....	212	105	105
TOTAL ENERGY CONSERVATION.....	71,800	65,204	64,753
NUCLEAR WASTE FUNO			
Nuclear Waste Disposal Fund			
Nuclear Waste Fund.....	3,181	500	546
TOTAL NUCLEAR WASTE FUND.....	3,181	500	546
ENERGY INFORMATION ADMINISTRATION			
Energy Information Administration			
National Energy Information System.....	299	100	100
TOTAL ENERGY INFORMATION ADMINISTRATION.....	299	100	100
TOTAL ILLINOIS.....	822,098	732,623	705,857

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INDIANA	FY 1995 COMPARABLE	FY 1996 COMPARABLE	FY 1997 REQUEST
ENERGY SUPPLY RESEARCH AND DEVELOPMENT ACTIVITIES			
Biological and Environmental Research			
Biological and Environmental Research	383	208	160
Supporting Research and Technical Analysis			
Basic Energy Sciences.....	9,639	9,806	6,686
Computational & Technology Research.....	235	235	0
TOTAL Supporting Research and Technical Analysis.....	9,874	10,041	6,686
TOTAL ENERGY SUPPLY RESEARCH AND DEVELOPMENT ACTIVITIES.....	10,257	10,249	6,846
GENERAL SCIENCE AND RESEARCH ACTIVITIES			
High Energy Physics			
High Energy Physics.....	4,143	3,801	4,193
Nuclear Physics			
Nuclear Physics.....	1,751	1,672	1,787
TOTAL GENERAL SCIENCE AND RESEARCH ACTIVITIES	5,894	5,473	5,980
FOSSIL ENERGY RESEARCH AND DEVELOPMENT			
Oil, Gas, and Shale Research and Development			
Natural Gas Research.....	3,760	0	0
TOTAL FOSSIL ENERGY RESEARCH AND DEVELOPMENT.....	3,760	0	0
ENERGY CONSERVATION			
Building Technologies, State, & Community Sector			
Grants.....	6,730	3,858	5,428
Industrial Technologies			
Industry Sector	2,500	6,300	7,000
TOTAL ENERGY CONSERVATION.....	9,230	10,158	12,428
TOTAL INDIANA.....	29,141	25,880	25,254

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10WA	FY 1995 COMPARABLE	FY 1996 COMPARABLE	FY 1997 REQUEST
ENERGY SUPPLY RESEARCH AND DEVELOPMENT ACTIVITIES			
Nuclear Fission			
Advanced Radioisotope Power Systems.....	375	365	300
Environmental Restoration and Waste Management			
Waste Management.....	670	300	315
Biological and Environmental Research			
Biological and Environmental Research.....	776	895	884
Supporting Research and Technical Analysis			
Basic Energy Sciences.....	15.816	16.272	16.484
Computational & Technology Research.....	6.053	5.657	4.900
TOTAL Supporting Research and Technical Analysis.....	21.869	21.929	21.384
University & Science Education			
University & Science Education.....	428	95	100
TOTAL ENERGY SUPPLY RESEARCH AND DEVELOPMENT ACTIVITIES.....	24.118	23.584	22.983
GENERAL SCIENCE AND RESEARCH ACTIVITIES			
High Energy Physics			
High Energy Physics.....	1.821	1.651	1.709
Nuclear Physics			
Nuclear Physics.....	527	527	546
TOTAL GENERAL SCIENCE AND RESEARCH ACTIVITIES.....	2.348	2.178	2.255
DEFENSE ENVIRONMENTAL RESTORATION & WASTE MANAGEMENT			
Environmental Restoration			
Environmental Restoration.....	696	250	200
Science and Technology			
Science and Technology.....	4.610	2.510	1.975
TOTAL DEFENSE ENVIRONMENTAL RESTORATION & WASTE MANAGEMENT.....	5.306	2.760	2.175
WESTERN AREA POWER ADMIN. CONST., REHAB., OPER. & MAINT.			
Systems Operation and Maintenance			
WAPA - Operation and Maintenance.....	2.207	1.153	1.641
Program Direction - WP			
Program Direction - WP.....	1.139	1.162	1.090
TOTAL WESTERN AREA POWER ADMIN. CONST., REHAB., OPER. & MAINT.....	3.346	2.315	2.731
FOSSIL ENERGY RESEARCH AND DEVELOPMENT			
Coal Research and Development			
Advanced Research and Tech. Development.....	294	0	0
Advanced Clean/Efficient Power Systems.....	50	0	0
TOTAL Coal Research and Development.....	344	0	0
TOTAL FOSSIL ENERGY RESEARCH AND DEVELOPMENT.....	344	0	0
ENERGY CONSERVATION			
Building Technologies, State, & Community Sector			
Grants.....	5.063	2.819	3.959
Industrial Technologies			
Industry Sector.....	225	150	150
TOTAL ENERGY CONSERVATION.....	5.288	2.969	4.109
TOTAL 10WA.....	40.750	33.806	34.253

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KANSAS	FY 1995 COMPARABLE	FY 1996 COMPARABLE	FY 1997 REQUEST
ENERGY SUPPLY RESEARCH AND DEVELOPMENT ACTIVITIES			
Biological and Environmental Research			
Biological and Environmental Research.....	477	455	260
Supporting Research and Technical Analysis			
Basic Energy Sciences.....	2,261	2,729	2,769
TOTAL ENERGY SUPPLY RESEARCH AND DEVELOPMENT ACTIVITIES.....	2,738	3,184	3,029
GENERAL SCIENCE AND RESEARCH ACTIVITIES			
High Energy Physics			
High Energy Physics.....	710	741	620
Nuclear Physics			
Nuclear Physics.....	99	112	112
TOTAL GENERAL SCIENCE AND RESEARCH ACTIVITIES.....	809	853	732
DEPARTMENTAL ADMINISTRATION			
Human Resources & Administration			
Program Direction - HR.....	203	203	203
TOTAL DEPARTMENTAL ADMINISTRATION.....	203	203	203
FOSSIL ENERGY RESEARCH AND DEVELOPMENT			
Oil, Gas, and Shale Research and Development			
Oil Technology.....	250	250	0
TOTAL FOSSIL ENERGY RESEARCH AND DEVELOPMENT.....	250	250	0
ENERGY CONSERVATION			
Building Technologies, State, & Community Sector			
Grants.....	2,746	1,575	2,235
Transportation Technologies			
Transportation Sector.....	270	0	0
Federal Energy Management Program			
Federal Energy Management Program.....	11	0	0
TOTAL ENERGY CONSERVATION.....	3,027	1,575	2,235
TOTAL KANSAS.....	7,027	6,065	6,199

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KENTUCKY	FY 1995 COMPARABLE	FY 1996 COMPARABLE	FY 1997 REQUEST
ENERGY SUPPLY RESEARCH AND DEVELOPMENT ACTIVITIES			
Biological and Environmental Research	151	166	175
Supporting Research and Technical Analysis	699	712	710
Basic Energy Sciences	850	878	885
TOTAL ENERGY SUPPLY RESEARCH AND DEVELOPMENT ACTIVITIES	850	878	885
URANIUM SUPPLY AND ENRICHMENT ACTIVITIES			
Uranium Supply and Enrichment Activities	22,224	20,886	15,827
TOTAL URANIUM SUPPLY AND ENRICHMENT ACTIVITIES	22,224	20,886	15,827
URANIUM ENRICHMENT DECON. & DECOM. FUND			
Uranium Enrichment D & D Fund	53,868	48,303	34,310
UE Decontamination & Decommissioning Fund	53,868	48,303	34,310
TOTAL URANIUM ENRICHMENT DECON. & DECOM. FUND	53,868	48,303	34,310
GENERAL SCIENCE AND RESEARCH ACTIVITIES			
Nuclear Physics	106	106	108
TOTAL GENERAL SCIENCE AND RESEARCH ACTIVITIES	106	106	108
FOSSIL ENERGY RESEARCH AND DEVELOPMENT			
Coal Research and Development	1,729	1,762	243
Advanced Clean Fuels Research	458	0	0
Advanced Clean/Efficient Power Systems	2,187	1,762	243
TOTAL Coal Research and Development	2,187	1,762	243
TOTAL FOSSIL ENERGY RESEARCH AND DEVELOPMENT	2,187	1,762	243
ENERGY CONSERVATION			
Building Technologies, State, & Community Sector	4,673	2,642	3,738
Grants	4,673	2,642	3,738
TOTAL ENERGY CONSERVATION	4,673	2,642	3,738
TOTAL KENTUCKY	83,908	74,577	55,111

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LOUISIANA	FY 1995 COMPARABLE	FY 1996 COMPARABLE	FY 1997 REQUEST
ENERGY SUPPLY RESEARCH AND DEVELOPMENT ACTIVITIES			
Biological and Environmental Research			
Biological and Environmental Research	130	0	18
Supporting Research and Technical Analysis			
Basic Energy Sciences	1,086	1,185	959
Computational & Technology Research	37	0	0
TOTAL Supporting Research and Technical Analysis	1,123	1,185	959
TOTAL ENERGY SUPPLY RESEARCH AND DEVELOPMENT ACTIVITIES	1,253	1,185	977
GENERAL SCIENCE AND RESEARCH ACTIVITIES			
High Energy Physics			
High Energy Physics	593	605	641
Nuclear Physics			
Nuclear Physics	315	298	300
TOTAL GENERAL SCIENCE AND RESEARCH ACTIVITIES	908	903	941
OFFICE OF THE INSPECTOR GENERAL			
Office of the Inspector General			
Office of Inspector General	635	457	526
TOTAL OFFICE OF THE INSPECTOR GENERAL	635	457	526
FOSSIL ENERGY RESEARCH AND DEVELOPMENT			
Oil, Gas, and Shale Research and Development			
Natural Gas Research	195	0	0
Program Direction and Management Support			
Energy Technology Center Program Direction	809	0	0
TOTAL FOSSIL ENERGY RESEARCH AND DEVELOPMENT	1,004	0	0
ENERGY CONSERVATION			
Building Technologies, State, & Community Sector			
Grants	1,897	1,307	1,963
TOTAL ENERGY CONSERVATION	1,897	1,307	1,963
STRATEGIC PETROLEUM RESERVE			
SPR - Facilities Development			
SPR - Facilities Development	174,208	118,388	135,183
TOTAL STRATEGIC PETROLEUM RESERVE	174,208	118,388	135,183
STRATEGIC PETROLEUM RESERVE - PETROLEUM ACCOUNT			
SPR - Petroleum Account			
SPR - Petroleum Account	4,500	4,500	4,500
TOTAL STRATEGIC PETROLEUM RESERVE - PETROLEUM ACCOUNT	4,500	4,500	4,500
STRATEGIC PETROLEUM RESERVE - DECOMMISSIONING FUND			
SPR - Decommissioning Fund			
SPR - Decommissioning Fund	0	100,000	0
TOTAL STRATEGIC PETROLEUM RESERVE - DECOMMISSIONING FUND	0	100,000	0
TOTAL LOUISIANA	184,405	226,740	144,090

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MAINE	FY 1995 COMPARABLE	FY 1996 COMPARABLE	FY 1997 REQUEST
ENERGY SUPPLY RESEARCH AND DEVELOPMENT ACTIVITIES			
Biological and Environmental Research			
Biological and Environmental Research.....	100	84	76
Supporting Research and Technical Analysis			
Basic Energy Sciences.....	69	59	69
TOTAL ENERGY SUPPLY RESEARCH AND DEVELOPMENT ACTIVITIES.....	169	143	145
DEPARTMENTAL ADMINISTRATION			
Human Resources & Administration			
Program Direction - HR.....	338	338	338
TOTAL DEPARTMENTAL ADMINISTRATION.....	338	338	338
FOSSIL ENERGY RESEARCH AND DEVELOPMENT			
Coal Research and Development			
Advanced Clean/Efficient Power Systems.....	2,590	0	0
Oil, Gas, and Shale Research and Development			
Natural Gas Research.....	1,100	0	0
TOTAL FOSSIL ENERGY RESEARCH AND DEVELOPMENT.....	3,690	0	0
ENERGY CONSERVATION			
Building Technologies, State, & Community Sector			
Grants.....	3,132	1,731	2,440
TOTAL ENERGY CONSERVATION.....	3,132	1,731	2,440
TOTAL MAINE.....	7,329	2,212	2,923

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MARYLAND	FY 1995 COMPARABLE	FY 1996 COMPARABLE	FY 1997 REQUEST
ENERGY SUPPLY RESEARCH AND DEVELOPMENT ACTIVITIES			
Biological and Environmental Research			
Biological and Environmental Research.....	8.825	9.049	8.850
Magnetic Fusion			
Fusion Energy Research.....	2.158	1.248	1.375
Supporting Research and Technical Analysis			
Basic Energy Sciences.....	2.631	3.962	2.898
Energy Research Analyses.....	171	0	0
Computational & Technology Research.....	1.513	1.210	915
TOTAL Supporting Research and Technical Analysis.....	4.315	5.172	3.813
TOTAL ENERGY SUPPLY RESEARCH AND DEVELOPMENT ACTIVITIES.....	15.298	15.469	14.038
GENERAL SCIENCE AND RESEARCH ACTIVITIES			
High Energy Physics			
High Energy Physics.....	3.590	3.557	3.607
Nuclear Physics			
Nuclear Physics.....	1.239	1.168	1.189
TOTAL GENERAL SCIENCE AND RESEARCH ACTIVITIES.....	4.829	4.725	4.796
WEAPONS ACTIVITIES			
Program Direction			
Program Direction - DP.....	87.365	78.053	85.540
Stockpile Management			
Stockpile Management.....	-8.501	7.520	14.937
Stockpile Stewardship			
Stockpile Stewardship.....	7.135	37.132	273.212
TOTAL WEAPONS ACTIVITIES.....	85.999	122.705	373.689
DEFENSE ENVIRONMENTAL RESTORATION & WASTE MANAGEMENT			
Science and Technology			
Science and Technology.....	25.842	13.960	17.165
Site Operations			
Site Operations.....	294	67	300
TOTAL DEFENSE ENVIRONMENTAL RESTORATION & WASTE MANAGEMENT.....	26.136	14.027	17.465
OTHER DEFENSE ACTIVITIES			
Nuclear Safeguards and Security			
Security Affairs.....	3.385	2.627	4.011
Program Direction			
Program Direction - NN.....	36.649	34.578	40.130
TOTAL OTHER DEFENSE ACTIVITIES.....	40.034	37.205	44.141
DEPARTMENTAL ADMINISTRATION			
Human Resources & Administration			
Program Direction - HR.....	22.133	22.233	15.468
TOTAL DEPARTMENTAL ADMINISTRATION.....	22.133	22.233	15.468
OFFICE OF THE INSPECTOR GENERAL			
Office of the Inspector General			
Office of Inspector General.....	4.514	3.870	4.316
TOTAL OFFICE OF THE INSPECTOR GENERAL.....	4.514	3.870	4.316

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MARYLAND

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FOSSIL ENERGY RESEARCH AND DEVELOPMENT

Coal Research and Development	1,224	979	1,073
Advanced Research and Tech. Development	386	197	170
Advanced Clean Fuels Research	1,850	3,263	1,944
Advanced Clean/Efficient Power Systems			

TOTAL Coal Research and Development	3,460	4,439	3,187
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Oil, Gas, and Shale Research and Development

Natural Gas Research	668	806	610
Fuel Cells	496	535	466
Oil Technology	3,493	1,972	1,180

TOTAL Oil, Gas, and Shale Research and Development	4,657	3,313	2,256
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Program Direction and Management Support

Headquarters Program Direction	17,725	15,649	14,901
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Environmental Restoration

Environmental Restoration - FE	200	150	170
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Cooperative R&D Ventures

Cooperative R&D	68	295	40
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TOTAL FOSSIL ENERGY RESEARCH AND DEVELOPMENT	26,110	23,846	20,554
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ENERGY CONSERVATION

Building Technologies, State, & Community Sector

Grants	3,067	1,798	2,532
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TOTAL ENERGY CONSERVATION	3,067	1,798	2,532
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ENERGY INFORMATION ADMINISTRATION

Energy Information Administration

National Energy Information System	9,798	9,362	6,121
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TOTAL ENERGY INFORMATION ADMINISTRATION	9,798	9,362	6,121
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TOTAL MARYLAND	237,918	255,240	503,120
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MASSACHUSETTS

	FY 1995 COMPARABLE	FY 1996 COMPARABLE	FY 1997 REQUEST
ENERGY SUPPLY RESEARCH AND DEVELOPMENT ACTIVITIES			
Solar and Renewable Energy			
Photovoltaic Systems R&D.....	1,300	600	600
Biofuels.....	200	600	375
Electric Energy Systems & Storage.....	0	0	10
TOTAL Solar and Renewable Energy.....	1,500	1,200	985
Nuclear Fission			
Advanced Reactor R&D.....	200	0	0
Termination Costs.....	0	190	0
TOTAL Nuclear Fission.....	200	190	0
Environmental Restoration and Waste Management			
Environmental Restoration.....	2,631	4,566	248
Biological and Environmental Research			
Biological and Environmental Research.....	11,409	8,279	8,298
Magnetic Fusion			
Fusion Energy Research.....	38,470	30,494	31,540
Supporting Research and Technical Analysis			
Basic Energy Sciences.....	5,456	4,532	4,849
Computational & Technology Research.....	845	502	175
TOTAL Supporting Research and Technical Analysis.....	6,301	5,034	5,024
TOTAL ENERGY SUPPLY RESEARCH AND DEVELOPMENT ACTIVITIES.....	60,511	49,763	46,095
GENERAL SCIENCE AND RESEARCH ACTIVITIES			
High Energy Physics			
High Energy Physics.....	15,881	16,608	15,524
Nuclear Physics			
Nuclear Physics.....	19,566	20,008	21,586
TOTAL GENERAL SCIENCE AND RESEARCH ACTIVITIES.....	35,447	36,616	37,110
FOSSIL ENERGY RESEARCH AND DEVELOPMENT			
Coal Research and Development			
Advanced Research and Tech. Development.....	350	6	0
Advanced Clean/Efficient Power Systems.....	306	0	0
TOTAL Coal Research and Development.....	656	6	0
Oil, Gas, and Shale Research and Development			
Natural Gas Research.....	300	118	0
Fuel Cells.....	200	200	200
TOTAL Oil, Gas, and Shale Research and Development.....	500	318	200
TOTAL FOSSIL ENERGY RESEARCH AND DEVELOPMENT.....	1,156	324	200
ENERGY CONSERVATION			
Building Technologies, State, & Community Sector			
Grants.....	6,675	3,847	5,375
Transportation Technologies			
Transportation Sector.....	251	0	0
Utility Technologies			
Utility Sector.....	280	0	0

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MASSACHUSETTS	FY 1995 COMPARABLE	FY 1996 COMPARABLE	FY 1997 REQUEST
Federal Energy Management Program			
Federal Energy Management Program.....	119	140	100
TOTAL ENERGY CONSERVATION.....	7.325	3.987	5.475
TOTAL MASSACHUSETTS	104.439	90.690	88.880

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MICHIGAN

	FY 1995 COMPARABLE	FY 1996 COMPARABLE	FY 1997 REQUEST
ENERGY SUPPLY RESEARCH AND DEVELOPMENT ACTIVITIES			
Environmental Restoration and Waste Management			
Environmental Restoration.....	2.272	152	0
Biological and Environmental Research			
Biological and Environmental Research.....	1.801	1.354	1.168
Magnetic Fusion			
Fusion Energy Research.....	0	0	50
Supporting Research and Technical Analysis			
Basic Energy Sciences.....	5.463	5.552	4.979
Computational & Technology Research.....	253	0	0
TOTAL Supporting Research and Technical Analysis.....	5.716	5.552	4.979
TOTAL ENERGY SUPPLY RESEARCH AND DEVELOPMENT ACTIVITIES.....	9.789	7.058	6.197
GENERAL SCIENCE AND RESEARCH ACTIVITIES			
High Energy Physics			
High Energy Physics.....	4.020	3.978	4.560
Nuclear Physics			
Nuclear Physics.....	423	480	482
TOTAL GENERAL SCIENCE AND RESEARCH ACTIVITIES.....	4.443	4.458	5.042
DEPARTMENTAL ADMINISTRATION			
Human Resources & Administration			
Program Direction - HR.....	95	95	95
TOTAL DEPARTMENTAL ADMINISTRATION.....	95	95	95
FOSSIL ENERGY RESEARCH AND DEVELOPMENT			
Oil, Gas, and Shale Research and Development			
Natural Gas Research.....	100	268	1.100
TOTAL FOSSIL ENERGY RESEARCH AND DEVELOPMENT.....	100	268	1.100
ENERGY CONSERVATION			
Building Technologies, State, & Community Sector			
Grants.....	15.000	8.456	11.805
TOTAL ENERGY CONSERVATION.....	15.000	8.456	11.805
TOTAL MICHIGAN.....	29.427	20.335	24.239

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MINNESOTA	FY 1995 COMPARABLE	FY 1996 COMPARABLE	FY 1997 REQUEST
ENERGY SUPPLY RESEARCH AND DEVELOPMENT ACTIVITIES			
Biological and Environmental Research			
Biological and Environmental Research.....	100	97	99
Supporting Research and Technical Analysis			
Basic Energy Sciences.....	1,886	2,017	1,959
Computational & Technology Research.....	522	654	278
TOTAL Supporting Research and Technical Analysis.....	2,408	2,671	2,237
TOTAL ENERGY SUPPLY RESEARCH AND DEVELOPMENT ACTIVITIES.....	2,508	2,768	2,336
GENERAL SCIENCE AND RESEARCH ACTIVITIES			
High Energy Physics			
High Energy Physics.....	2,499	2,555	2,297
Nuclear Physics			
Nuclear Physics.....	542	663	555
TOTAL GENERAL SCIENCE AND RESEARCH ACTIVITIES.....	3,041	3,218	2,852
DEPARTMENTAL ADMINISTRATION			
Human Resources & Administration			
Program Direction - HR.....	41	42	41
TOTAL DEPARTMENTAL ADMINISTRATION.....	41	42	41
WESTERN AREA POWER ADMIN. CONST., REHAB., OPER. & MAINT.			
Systems Operation and Maintenance			
WAPA - Operation and Maintenance.....	86	71	184
TOTAL WESTERN AREA POWER ADMIN. CONST., REHAB., OPER. & MAINT.....	86	71	184
ENERGY CONSERVATION			
Building Technologies, State, & Community Sector			
Grants.....	10,043	5,435	7,583
TOTAL ENERGY CONSERVATION.....	10,043	5,435	7,583
TOTAL MINNESOTA.....	15,719	11,534	12,996

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MISSISSIPPI	FY 1995 COMPARABLE	FY 1996 COMPARABLE	FY 1997 REQUEST
ENERGY SUPPLY RESEARCH AND DEVELOPMENT ACTIVITIES			
Biological and Environmental Research			
Biological and Environmental Research.....	143	114	487
Magnetic Fusion			
Fusion Energy Research.....	73	0	0
Supporting Research and Technical Analysis			
Computational & Technology Research.....	560	360	0
TOTAL ENERGY SUPPLY RESEARCH AND DEVELOPMENT ACTIVITIES.....	776	474	487
GENERAL SCIENCE AND RESEARCH ACTIVITIES			
High Energy Physics			
High Energy Physics.....	242	215	208
Nuclear Physics			
Nuclear Physics.....	95	58	75
TOTAL GENERAL SCIENCE AND RESEARCH ACTIVITIES.....	337	273	283
SOUTHEASTERN POWER ADMIN. - OPERATION & MAINTENANCE			
Purchase Power and Wheeling			
Purchase Power and Wheeling.....	1.111	1.140	1.304
TOTAL SOUTHEASTERN POWER ADMIN. - OPERATION & MAINTENANCE.....	1.111	1.140	1.304
ENERGY CONSERVATION			
Building Technologies, State, & Community Sector			
Grants.....	1.753	1.090	1.574
TOTAL ENERGY CONSERVATION.....	1.753	1.090	1.574
TOTAL MISSISSIPPI.....	3.977	2.977	3.648

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MISSOURI	FY 1995 COMPARABLE	FY 1996 COMPARABLE	FY 1997 REQUEST
ENERGY SUPPLY RESEARCH AND DEVELOPMENT ACTIVITIES			
Environmental Restoration and Waste Management			
Environmental Restoration.....	57.820	74.073	82.908
Biological and Environmental Research			
Biological and Environmental Research.....	1.884	1.757	1.621
Magnetic Fusion			
Fusion Energy Research.....	119	96	100
Supporting Research and Technical Analysis			
Basic Energy Sciences.....	1.259	971	1.151
In-House Energy Management			
In-House Energy Management.....	123	0	0
TOTAL ENERGY SUPPLY RESEARCH AND DEVELOPMENT ACTIVITIES.....	61.205	76.897	85.780
GENERAL SCIENCE AND RESEARCH ACTIVITIES			
High Energy Physics			
High Energy Physics.....	355	360	344
Nuclear Physics			
Nuclear Physics.....	436	442	448
TOTAL GENERAL SCIENCE AND RESEARCH ACTIVITIES.....	791	802	792
WEAPONS ACTIVITIES			
Program Direction			
Program Direction - DP.....	5.247	3.945	4.120
Stockpile Management			
Stockpile Management.....	282.537	311.134	274.700
Stockpile Stewardship			
Stockpile Stewardship.....	6.406	3.336	2.400
TOTAL WEAPONS ACTIVITIES.....	294.190	318.415	281.220
DEFENSE ENVIRONMENTAL RESTORATION & WASTE MANAGEMENT			
Environmental Restoration			
Environmental Restoration.....	1.498	8.529	5.256
Waste Management			
Waste Management.....	5.143	5.514	8.124
TOTAL DEFENSE ENVIRONMENTAL RESTORATION & WASTE MANAGEMENT.....	6.641	14.043	13.380
OTHER DEFENSE ACTIVITIES			
Verification and Control Technology			
Intelligence.....	15	0	0
TOTAL OTHER DEFENSE ACTIVITIES.....	15	0	0
DEPARTMENTAL ADMINISTRATION			
Human Resources & Administration			
Program Direction - HR.....	163	163	163
TOTAL DEPARTMENTAL ADMINISTRATION.....	163	163	163
SOUTHWESTERN POWER ADMIN. - OPERATION & MAINTENANCE			
Systems Operation and Maintenance			
SWPA - Operation and Maintenance.....	9.321	8.532	6.752
TOTAL SOUTHWESTERN POWER ADMIN. - OPERATION & MAINTENANCE.....	9.321	8.532	6.752

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MISSOURI	FY 1995 COMPARABLE	FY 1996 COMPARABLE	FY 1997 REQUEST
SOUTHWESTERN POWER ADMINISTRATION - CONTINUING FUND			
Continuing Fund			
SWPA - Continuing Fund.....	300	300	300
TOTAL SOUTHWESTERN POWER ADMINISTRATION - CONTINUING FUND.....	300	300	300
FOSSIL ENERGY RESEARCH AND DEVELOPMENT			
Oil, Gas, and Shale Research and Development			
Fuel Cells.....	181	0	200
TOTAL FOSSIL ENERGY RESEARCH AND DEVELOPMENT.....	181	0	200
ENERGY CONSERVATION			
Building Technologies, State, & Community Sector			
Grants.....	5.963	3.488	4.904
TOTAL ENERGY CONSERVATION.....	5.963	3.488	4.904
TOTAL MISSOURI.....	378.770	422.640	393.491

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MONTANA	FY 1995 COMPARABLE	FY 1996 COMPARABLE	FY 1997 REQUEST
ENERGY SUPPLY RESEARCH AND DEVELOPMENT ACTIVITIES			
Biological and Environmental Research	0	170	0
Biological and Environmental Research.....	-----	-----	-----
TOTAL ENERGY SUPPLY RESEARCH AND DEVELOPMENT ACTIVITIES.....	0	170	0
BONNEVILLE POWER ADMINISTRATION FUND			
Bonneville Power Administration			
Bonneville Power Administration.....	57.376	65.201	62.783
TOTAL BONNEVILLE POWER ADMINISTRATION FUND.....	57.376	65.201	62.783
WESTERN AREA POWER ADMIN. CONST., REHAB., OPER. & MAINT			
Systems Operation and Maintenance			
WAPA - Operation and Maintenance.....	4.867	3.809	3.201
Program Direction - WP			
Program Direction - WP.....	6.833	6.973	6.542
TOTAL WESTERN AREA POWER ADMIN. CONST., REHAB., OPER. & MAINT.....	11.700	10.782	9.743
COLORADO RIVER BASINS POWER MARKETING FUND (WAPA)			
Colorado River Storage Project			
Colorado River Basins Fund.....	1.261	1.897	1.758
Program Direction			
Program Direction.....	2.362	2.440	2.579
TOTAL COLORADO RIVER BASINS POWER MARKETING FUND (WAPA)	3.623	4.337	4.337
FOSSIL ENERGY RESEARCH AND DEVELOPMENT			
Coal Research and Development			
Advanced Clean Fuels Research.....	300	94	425
TOTAL FOSSIL ENERGY RESEARCH AND DEVELOPMENT.....	300	94	425
ENERGY CONSERVATION			
Building Technologies, State, & Community Sector			
Grants.....	2.659	1.431	2.030
TOTAL ENERGY CONSERVATION.....	2.659	1.431	2.030
TOTAL MONTANA.....	75.658	82.015	79.318

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NEBRASKA

	FY 1995 COMPARABLE	FY 1996 COMPARABLE	FY 1997 REQUEST
ENERGY SUPPLY RESEARCH AND DEVELOPMENT ACTIVITIES			
Biological and Environmental Research	5.513	269	320
Supporting Research and Technical Analysis			
Basic Energy Sciences	251	307	310
Computational & Technology Research	133	115	106
TOTAL Supporting Research and Technical Analysis	384	422	416
TOTAL ENERGY SUPPLY RESEARCH AND DEVELOPMENT ACTIVITIES	5.897	691	736
GENERAL SCIENCE AND RESEARCH ACTIVITIES			
Nuclear Physics	110	110	120
TOTAL GENERAL SCIENCE AND RESEARCH ACTIVITIES	110	110	120
DEPARTMENTAL ADMINISTRATION			
Human Resources & Administration	32	32	32
Program Direction - HR			
TOTAL DEPARTMENTAL ADMINISTRATION	32	32	32
WESTERN AREA POWER ADMIN. CONST. REHAB. OPER. & MAINT.			
Systems Operation and Maintenance	6.879	4.678	4.151
WAPA - Operation and Maintenance			
Program Direction - WP	2.278	2.324	2.181
Program Direction - WP			
TOTAL WESTERN AREA POWER ADMIN. CONST. REHAB. OPER. & MAINT.	9.157	7.002	6.332
ENERGY CONSERVATION			
Building Technologies, State, & Community Sector	2.677	1.474	2.088
Grants			
TOTAL ENERGY CONSERVATION	2.677	1.474	2.088
TOTAL: NEBRASKA	17.873	9.309	9.308

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NEVADA	FY 1995 COMPARABLE	FY 1996 COMPARABLE	FY 1997 REQUEST
ENERGY SUPPLY RESEARCH AND DEVELOPMENT ACTIVITIES			
Nuclear Fission			
Advanced Radioisotope Power Systems.....	300	285	1.085
Biological and Environmental Research			
Biological and Environmental Research.....	644	606	556
Supporting Research and Technical Analysis			
Basic Energy Sciences.....	105	145	150
In-House Energy Management			
In-House Energy Management.....	595	0	0
TOTAL ENERGY SUPPLY RESEARCH AND DEVELOPMENT ACTIVITIES.....	1,644	1,036	1,791
URANIUM SUPPLY AND ENRICHMENT ACTIVITIES			
Uranium Supply and Enrichment Activities			
Uranium Supply and Enrichment Activities.....	506	0	380
TOTAL URANIUM SUPPLY AND ENRICHMENT ACTIVITIES.....	506	0	380
WEAPONS ACTIVITIES			
Program Direction			
Program Direction - DP.....	40,215	38,490	38,165
Stockpile Management			
Stockpile Management.....	30,545	33,545	34,175
Stockpile Stewardship			
Stockpile Stewardship.....	200,481	183,122	163,525*
TOTAL WEAPONS ACTIVITIES.....	271,241	255,157	235,865
DEFENSE ENVIRONMENTAL RESTORATION & WASTE MANAGEMENT			
Environmental Restoration			
Environmental Restoration.....	34,543	47,891	53,192
Waste Management			
Waste Management.....	21,553	15,512	16,603
Science and Technology			
Science and Technology.....	2,841	2,682	1,791
Site Operations			
Site Operations.....	3,228	1,757	2,850
Program Direction			
Program Direction - EM.....	6,972	7,395	7,495
Environmental Management Science Program			
Environmental Management Science Program.....	200	200	0
TOTAL DEFENSE ENVIRONMENTAL RESTORATION & WASTE MANAGEMENT.....	69,337	75,437	81,931
OTHER DEFENSE ACTIVITIES			
Verification and Control Technology			
Arms Control.....	350	0	0
Intelligence.....	6,534	6,510	6,180
Nonproliferation & Verification R&D.....	4,164	3,700	2,050
TOTAL Verification and Control Technology.....	11,048	10,210	8,230
Nuclear Safeguards and Security			
Security Affairs.....	0	300	150

* The FY 1997 requests for the National Ignition Facility (NIF) and Accelerated Strategic Computing Initiative (ASCI) are currently included in the estimate for Washington headquarters, pending final site selection.

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NEVADA	FY 1995 COMPARABLE	FY 1996 COMPARABLE	FY 1997 REQUEST
Security Investigations			
Security Investigations.....	1.000	700	600
Worker and Community Transition			
Worker and Community Transition.....	16.587	6.500	0
Fissile Materials Control & Disposition			
Fissile Materials Control & Disposition.....	0	25	0
Emergency Management			
Emergency Management.....	4.340	6.700	6.700
Program Direction			
Program Direction - NN.....	1.093	1.128	1.153
TOTAL OTHER DEFENSE ACTIVITIES.....	34.068	25.563	16.833
DEPARTMENTAL ADMINISTRATION			
Human Resources & Administration			
Program Direction - HR.....	1.420	0	0
TOTAL DEPARTMENTAL ADMINISTRATION.....	1.420	0	0
OFFICE OF THE INSPECTOR GENERAL			
Office of the Inspector General			
Office of Inspector General.....	635	457	526
TOTAL OFFICE OF THE INSPECTOR GENERAL.....	635	457	526
WESTERN AREA POWER ADMIN. CONST., REHAB., OPER. & MAINT.			
Systems Operation and Maintenance			
WAPA - Operation and Maintenance.....	5.318	3.522	3.039
Program Direction - WP			
Program Direction - WP.....	1.138	1.162	1.090
TOTAL WESTERN AREA POWER ADMIN. CONST., REHAB., OPER. & MAINT.....	6.456	4.684	4.129
ENERGY CONSERVATION			
Building Technologies, State, & Community Sector			
Grants.....	1.063	597	870
Transportation Technologies			
Transportation Sector.....	3.278	2.190	0
TOTAL ENERGY CONSERVATION.....	4.341	2.787	870
NUCLEAR WASTE FUND			
Nuclear Waste Disposal Fund			
Nuclear Waste Fund.....	104.184	51.519	72.287
Program Direction - RW.....	694	348	682
TOTAL Nuclear Waste Disposal Fund.....	104.878	51.867	72.969
TOTAL NUCLEAR WASTE FUND.....	104.878	51.867	72.969
DEFENSE NUCLEAR WASTE DISPOSAL			
Defense Nuclear Waste Disposal			
Defense Nuclear Waste Disposal.....	21.409	28.664	35.082
TOTAL DEFENSE NUCLEAR WASTE DISPOSAL.....	21.409	28.664	35.082
TOTAL NEVADA.....	515.935	445.652	450.376

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NEW HAMPSHIRE	FY 1995 COMPARABLE	FY 1996 COMPARABLE	FY 1997 REQUEST
ENERGY SUPPLY RESEARCH AND DEVELOPMENT ACTIVITIES			
Biological and Environmental Research			
Biological and Environmental Research.....	9	0	0
Magnetic Fusion			
Fusion Energy Research.....	50	40	0
Supporting Research and Technical Analysis			
Basic Energy Sciences.....	665	484	509
TOTAL ENERGY SUPPLY RESEARCH AND DEVELOPMENT ACTIVITIES.....	724	524	509
GENERAL SCIENCE AND RESEARCH ACTIVITIES			
Nuclear Physics			
Nuclear Physics	511	526	526
TOTAL GENERAL SCIENCE AND RESEARCH ACTIVITIES.....	511	526	526
ENERGY CONSERVATION			
Building Technologies, State, & Community Sector			
Grants.....	1,722	951	1,346
TOTAL ENERGY CONSERVATION.....	1,722	951	1,346
TOTAL NEW HAMPSHIRE.....	2,957	2,001	2,381

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NEW JERSEY

	FY 1995 COMPARABLE	FY 1996 COMPARABLE	FY 1997 REQUEST
ENERGY SUPPLY RESEARCH AND DEVELOPMENT ACTIVITIES			
Environmental Restoration and Waste Management			
Environmental Restoration.....	20,505	30,948	25,330
Waste Management.....	7,918	2,371	5,925
TOTAL Environmental Restoration and Waste Management.....	28,423	33,319	31,255
Biological and Environmental Research			
Biological and Environmental Research.....	2,006	1,990	1,917
Magnetic Fusion			
Fusion Energy Research.....	118,737	60,431	67,810
Supporting Research and Technical Analysis			
Basic Energy Sciences.....	2,021	1,471	1,879
Computational & Technology Research.....	990	277	106
TOTAL Supporting Research and Technical Analysis.....	3,011	1,748	1,985
In-House Energy Management			
In-House Energy Management.....	453	0	0
University & Science Education			
University & Science Education.....	381	300	300
TOTAL ENERGY SUPPLY RESEARCH AND DEVELOPMENT ACTIVITIES.....	153,011	97,788	103,267
GENERAL SCIENCE AND RESEARCH ACTIVITIES			
High Energy Physics			
High Energy Physics.....	4,370	4,155	4,448
Nuclear Physics			
Nuclear Physics.....	304	271	272
TOTAL GENERAL SCIENCE AND RESEARCH ACTIVITIES.....	4,674	4,426	4,720
DEPARTMENTAL ADMINISTRATION			
Human Resources & Administration			
Program Direction - HR.....	282	282	282
TOTAL DEPARTMENTAL ADMINISTRATION.....	282	282	282
OFFICE OF THE INSPECTOR GENERAL			
Office of the Inspector General			
Office of Inspector General.....	723	457	526
TOTAL OFFICE OF THE INSPECTOR GENERAL.....	723	457	526
FOSSIL ENERGY RESEARCH AND DEVELOPMENT			
Coal Research and Development			
Advanced Research and Tech. Development.....	100	75	0
Advanced Clean Fuels Research.....	2,561	500	508
Advanced Clean/Efficient Power Systems.....	2,500	0	0
TOTAL Coal Research and Development.....	5,161	575	508
TOTAL FOSSIL ENERGY RESEARCH AND DEVELOPMENT.....	5,161	575	508
ENERGY CONSERVATION			
Building Technologies, State, & Community Sector			
Grants.....	5,556	3,297	4,617
Industrial Technologies			
Industry Sector.....	4,565	3,821	4,878
TOTAL ENERGY CONSERVATION.....	10,121	7,118	9,495

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NEW JERSEY	FY 1995 COMPARABLE	FY 1996 COMPARABLE	FY 1997 REQUEST
ENERGY INFORMATION ADMINISTRATION			
Energy Information Administration			
National Energy Information System	4,030	300	0
	-----	-----	-----
TOTAL ENERGY INFORMATION ADMINISTRATION	4,030	300	0
	-----	-----	-----
TOTAL NEW JERSEY	178,002	110,946	118,798
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NEW MEXICO

	FY 1995 COMPARABLE	FY 1996 COMPARABLE	FY 1997 REQUEST
ENERGY SUPPLY RESEARCH AND DEVELOPMENT ACTIVITIES			
Solar and Renewable Energy			
Photovoltaic Systems R&D	12,970	8,750	11,000
Solar Thermal R&D	17,042	12,818	14,570
Biofuels	500	401	400
Wind Energy	3,180	3,150	3,150
Resource Assessment	34	0	0
Geothermal Energy R&D	12,082	6,945	7,175
Electric Energy Systems & Storage	7,963	5,900	8,760
Hydrogen Research R&D	2,012	2,750	1,818
Solar and Renewable Energy Deployment	98	100	100
TOTAL Solar and Renewable Energy	55,881	40,814	46,973
Nuclear Fission			
Light Water Reactors	4,753	5,000	5,500
Space Reactor Power Systems	60	0	0
Advanced Radioisotope Power Systems	12,972	12,816	14,645
Isotope Support	9,850	13,500	1,400
TOTAL Nuclear Fission	27,635	31,316	21,545
Environment, Safety and Health			
Environment, Safety and Health	1,340	1,202	1,115
Environmental Restoration and Waste Management			
Environmental Restoration	7,037	3,912	2,368
Waste Management	654	604	596
Site Operations	21	26	40
TOTAL Environmental Restoration and Waste Management	7,712	4,542	3,004
Biological and Environmental Research			
Biological and Environmental Research	35,453	29,794	28,063
Magnetic Fusion			
Fusion Energy Research	15,008	10,020	9,275
Supporting Research and Technical Analysis			
Basic Energy Sciences	21,377	28,505	25,493
Computational & Technology Research	18,928	17,427	17,665
TOTAL Supporting Research and Technical Analysis	40,305	45,932	43,158
In-House Energy Management			
In-House Energy Management	1,570	0	0
University & Science Education			
University & Science Education	6,681	1,735	1,800
TOTAL ENERGY SUPPLY RESEARCH AND DEVELOPMENT ACTIVITIES	191,585	165,355	154,933
URANIUM SUPPLY AND ENRICHMENT ACTIVITIES			
Uranium Supply and Enrichment Activities			
Uranium Supply and Enrichment Activities	1,170	50	0
TOTAL URANIUM SUPPLY AND ENRICHMENT ACTIVITIES	1,170	50	0
GENERAL SCIENCE AND RESEARCH ACTIVITIES			
High Energy Physics			
High Energy Physics	1,305	1,219	1,231
Nuclear Physics			
Nuclear Physics	40,533	12,770	11,328
TOTAL GENERAL SCIENCE AND RESEARCH ACTIVITIES	41,838	13,989	12,559

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NEW MEXICO	FY 1995 COMPARABLE	FY 1996 COMPARABLE	FY 1997 REQUEST
WEAPONS ACTIVITIES			
Program Direction			
Program Direction - DP.....	180,657	172,130	170,501
Stockpile Management			
Stockpile Management.....	400,441	513,943	546,749
Stockpile Stewardship			
Stockpile Stewardship.....	769,094	791,609	747,863*
TOTAL WEAPONS ACTIVITIES.....	1,350,192	1,477,682	1,465,113
DEFENSE ENVIRONMENTAL RESTORATION & WASTE MANAGEMENT			
Environmental Restoration			
Environmental Restoration.....	114,800	87,922	65,954
Waste Management			
Waste Management.....	260,323	260,381	234,470
Science and Technology			
Science and Technology.....	27,586	25,023	20,195
Site Operations			
Site Operations.....	13,665	7,500	9,209
Program Direction			
Program Direction - EM.....	24,580	25,757	25,830
Nuclear Materials & Facilities Stabilization			
Nuclear Materials & Facilities Stabilization.....	0	16,223	16,000
Policy and Management			
Policy and Management.....	400	1,790	2,200
Environmental Management Science Program			
Environmental Management Science Program.....	600	350	0
TOTAL DEFENSE ENVIRONMENTAL RESTORATION & WASTE MANAGEMENT.....	441,954	424,946	373,858
OTHER DEFENSE ACTIVITIES			
Verification and Control Technology			
Arms Control.....	29,245	55,289	74,606
Intelligence.....	8,257	8,171	7,715
Nonproliferation & Verification R&D.....	127,841	127,575	117,360
TOTAL Verification and Control Technology.....	165,343	191,035	199,681
Nuclear Safeguards and Security			
Security Affairs.....	24,767	23,209	23,355
Security Investigations			
Security Investigations.....	8,000	6,977	5,275
Worker and Community Transition			
Worker and Community Transition.....	31,871	21,649	0
Fissile Materials Control & Disposition			
Fissile Materials Control & Disposition.....	9,202	16,995	24,900
Emergency Management			
Emergency Management.....	150	100	100
Environment, Safety, and Health			
Environment, Safety, and Health.....	90	90	90
TOTAL OTHER DEFENSE ACTIVITIES.....	239,423	260,055	253,401

* The FY 1997 requests for the National Ignition Facility (NIF) and Accelerated Strategic Computing Initiative (ASCI) are currently included in the estimate for Washington headquarters, pending final site selection.

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NEW MEXICO	FY 1995 COMPARABLE	FY 1996 COMPARABLE	FY 1997 REQUEST
DEPARTMENTAL ADMINISTRATION			
Cost of Work for Others			
Cost of Work for Others.....	1.700	2.000	2.000
Human Resources & Administration			
Program Direction - HR.....	531	531	531
Economic Impact & Diversity			
Minority Economic Impact.....	100	90	90
TOTAL DEPARTMENTAL ADMINISTRATION.....	2.331	2.621	2.621
OFFICE OF THE INSPECTOR GENERAL			
Office of the Inspector General			
Office of Inspector General.....	3.729	2.973	3.062
TOTAL OFFICE OF THE INSPECTOR GENERAL.....	3.729	2.973	3.062
COLORADO RIVER BASINS POWER MARKETING FUND (WAPA)			
Colorado River Storage Project			
Colorado River Basins Fund.....	6.220	9.736	8.769
Program Direction			
Program Direction.....	262	271	287
TOTAL COLORADO RIVER BASINS POWER MARKETING FUND (WAPA).....	6.482	10.007	9.056
FOSSIL ENERGY RESEARCH AND DEVELOPMENT			
Coal Research and Development			
Advanced Research and Tech. Development.....	601	475	350
Advanced Clean Fuels Research.....	1.652	1.150	1.210
TOTAL Coal Research and Development.....	2.253	1.625	1.560
Oil, Gas, and Shale Research and Development			
Natural Gas Research.....	1.140	723	853
Oil Technology.....	6.365	5.365	8.089
TOTAL Oil, Gas, and Shale Research and Development.....	7.505	6.088	8.942
TOTAL FOSSIL ENERGY RESEARCH AND DEVELOPMENT.....	9.758	7.713	10.502
ENERGY CONSERVATION			
Building Technologies, State, & Community Sector			
Grants.....	1.932	1.173	1.679
Industrial Technologies			
Industry Sector.....	9.601	9.403	5.293
Transportation Technologies			
Transportation Sector.....	4.786	3.530	9.189
Federal Energy Management Program			
Federal Energy Management Program.....	90	135	155
TOTAL ENERGY CONSERVATION.....	16.409	14.241	16.316
NUCLEAR WASTE FUND			
Nuclear Waste Disposal Fund			
Nuclear Waste Fund.....	37.793	16.446	22.785
TOTAL NUCLEAR WASTE FUND.....	37.793	16.446	22.785

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NEW MEXICO	FY 1995 COMPARABLE	FY 1996 COMPARABLE	FY 1997 REQUEST
DEFENSE NUCLEAR WASTE DISPOSAL			
Defense Nuclear Waste Disposal			
Defense Nuclear Waste Disposal.....	13,703	11,111	13,600
TOTAL DEFENSE NUCLEAR WASTE DISPOSAL.....	13,703	11,111	13,600
STRATEGIC PETROLEUM RESERVE			
SPR - Facilities Development			
SPR - Facilities Development.....	3,010	2,506	2,961
TOTAL STRATEGIC PETROLEUM RESERVE.....	3,010	2,506	2,961
TOTAL NEW MEXICO.....	2,359,377	2,409,695	2,340,767

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NEW YORK

	FY 1995 COMPARABLE	FY 1996 COMPARABLE	FY 1997 REQUEST
ENERGY SUPPLY RESEARCH AND DEVELOPMENT ACTIVITIES			
Solar and Renewable Energy			
Photovoltaic Systems R&D	380	300	400
Biofuels	810	0	0
Geothermal Energy R&D	1,722	1,380	1,400
Electric Energy Systems & Storage	551	350	400
TOTAL Solar and Renewable Energy	3,463	2,030	2,200
Nuclear Fission			
Advanced Reactor R&D	150	0	0
Isotope Support	428	1,100	1,600
TOTAL Nuclear Fission	578	1,100	1,600
Environment, Safety and Health			
Environment, Safety and Health	3,968	3,522	3,278
Environmental Restoration and Waste Management			
Environmental Restoration	32,004	38,135	52,619
Waste Management	11,202	5,016	5,850
TOTAL Environmental Restoration and Waste Management	43,206	43,151	58,469
Biological and Environmental Research			
Biological and Environmental Research	40,001	32,154	32,114
Magnetic Fusion			
Fusion Energy Research	3,827	3,088	3,222
Supporting Research and Technical Analysis			
Basic Energy Sciences	80,681	91,223	89,081
Energy Research Analyses	100	0	0
Computational & Technology Research	11,759	5,906	6,200
TOTAL Supporting Research and Technical Analysis	92,540	97,129	95,281
Multiprogram Facilities Support			
Multiprogram Energy Labs - Facilities Support	7,782	9,825	13,262
In-House Energy Management			
In-House Energy Management	1,934	0	0
University & Science Education			
University & Science Education	2,063	695	900
TOTAL ENERGY SUPPLY RESEARCH AND DEVELOPMENT ACTIVITIES	199,362	192,694	210,326
URANIUM SUPPLY AND ENRICHMENT ACTIVITIES			
Uranium Supply and Enrichment Activities			
Uranium Supply and Enrichment Activities	300	100	0
TOTAL URANIUM SUPPLY AND ENRICHMENT ACTIVITIES	300	100	0
GENERAL SCIENCE AND RESEARCH ACTIVITIES			
High Energy Physics			
High Energy Physics	83,980	81,966	76,521
Nuclear Physics			
Nuclear Physics	102,962	102,631	109,583
TOTAL GENERAL SCIENCE AND RESEARCH ACTIVITIES	186,942	184,597	186,104

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NEW YORK	FY 1995 COMPARABLE	FY 1996 COMPARABLE	FY 1997 REQUEST
WEAPONS ACTIVITIES			
Stockpile Management			
Stockpile Management.....	1.163	1.980	3.300
Stockpile Stewardship			
Stockpile Stewardship.....	20.900	20.275	20.295
TOTAL WEAPONS ACTIVITIES.....	22.063	22.255	23.595
DEFENSE ENVIRONMENTAL RESTORATION & WASTE MANAGEMENT			
Science and Technology			
Science and Technology.....	1.764	1.900	530
Nuclear Materials & Facilities Stabilization			
Nuclear Materials & Facilities Stabilization.....	0	124	0
TOTAL DEFENSE ENVIRONMENTAL RESTORATION & WASTE MANAGEMENT.....	1.764	2.024	530
OTHER DEFENSE ACTIVITIES			
Verification and Control Technology			
Arms Control.....	1.406	4.255	6.125
Nonproliferation & Verification R&D.....	4.578	4.775	2.600
TOTAL Verification and Control Technology.....	5.984	9.030	8.725
Nuclear Safeguards and Security			
Security Affairs.....	427	494	450
Security Investigations			
Security Investigations.....	724	712	500
Naval Reactors			
Naval Reactors Development.....	261.285	253.168	240.200
Program Direction - NE.....	4.600	4.700	4.700
TOTAL Naval Reactors.....	265.885	257.868	244.900
Fissile Materials Control & Disposition			
Fissile Materials Control & Disposition.....	320	0	0
Emergency Management			
Emergency Management.....	200	300	300
Environment, Safety, and Health			
Environment, Safety, and Health.....	41	100	100
TOTAL OTHER DEFENSE ACTIVITIES.....	273.581	268.504	254.975
DEPARTMENTAL ADMINISTRATION			
Office of Policy			
Environmental Policy Studies.....	50	33	0
Cost of Work for Others			
Cost of Work for Others.....	0	1.150	1.662
TOTAL DEPARTMENTAL ADMINISTRATION.....	50	1.183	1.662
BONNEVILLE POWER ADMINISTRATION FUND			
Bonneville Power Administration			
Bonneville Power Administration.....	106	123	117
TOTAL BONNEVILLE POWER ADMINISTRATION FUND.....	106	123	117

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NEW YORK	FY 1995 COMPARABLE	FY 1996 COMPARABLE	FY 1997 REQUEST
FOSSIL ENERGY RESEARCH AND DEVELOPMENT			
Coal Research and Development			
Advanced Research and Tech. Development.....	94	50	0
Advanced Clean Fuels Research.....	100	0	0
Advanced Clean/Efficient Power Systems.....	1,466	2,650	3,111
TOTAL Coal Research and Development.....	1,660	2,700	3,111
Oil, Gas, and Shale Research and Development			
Natural Gas Research.....	8,496	1,975	150
Oil Technology.....	825	925	400
TOTAL Oil, Gas, and Shale Research and Development.....	9,321	2,900	550
TOTAL FOSSIL ENERGY RESEARCH AND DEVELOPMENT.....	10,981	5,600	3,661
ENERGY CONSERVATION			
Building Technologies, State, & Community Sector			
Research & Development.....	1,400	1,550	550
Grants.....	19,413	11,499	15,982
TOTAL Building Technologies, State, & Community Sector.....	20,813	13,049	16,532
Transportation Technologies			
Transportation Sector.....	799	500	0
Federal Energy Management Program			
Federal Energy Management Program.....	163	7	5
TOTAL ENERGY CONSERVATION.....	21,775	13,556	16,537
TOTAL NEW YORK.....	716,924	690,636	697,507

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NORTH CAROLINA

	FY 1995 COMPARABLE	FY 1996 COMPARABLE	FY 1997 REQUEST
ENERGY SUPPLY RESEARCH AND DEVELOPMENT ACTIVITIES			
Biological and Environmental Research			
Biological and Environmental Research.....	4.967	3.551	2.000
Magnetic Fusion			
Fusion Energy Research.....	88	0	0
Supporting Research and Technical Analysis			
Basic Energy Sciences.....	2.180	2.114	2.079
Energy Research Analyses.....	135	0	0
Computational & Technology Research.....	50	52	52
TOTAL Supporting Research and Technical Analysis.....	2.365	2.166	2.131
TOTAL ENERGY SUPPLY RESEARCH AND DEVELOPMENT ACTIVITIES.....	7.420	5.717	4.131
GENERAL SCIENCE AND RESEARCH ACTIVITIES			
High Energy Physics			
High Energy Physics.....	928	910	948
Nuclear Physics			
Nuclear Physics.....	3.718	3.716	3.642
TOTAL GENERAL SCIENCE AND RESEARCH ACTIVITIES.....	4.646	4.626	4.590
SOUTHEASTERN POWER ADMIN. - OPERATION & MAINTENANCE			
Purchase Power and Wheeling			
Purchase Power and Wheeling.....	5.321	4.026	5.051
TOTAL SOUTHEASTERN POWER ADMIN. - OPERATION & MAINTENANCE.....	5.321	4.026	5.051
FOSSIL ENERGY RESEARCH AND DEVELOPMENT			
Coal Research and Development			
Advanced Clean Fuels Research.....	250	0	61
Advanced Clean/Efficient Power Systems.....	674	300	789
TOTAL Coal Research and Development.....	924	300	850
TOTAL FOSSIL ENERGY RESEARCH AND DEVELOPMENT.....	924	300	850
ENERGY CONSERVATION			
Building Technologies, State, & Community Sector			
Grants.....	4.173	2.573	3.706
TOTAL ENERGY CONSERVATION.....	4.173	2.573	3.706
TOTAL NORTH CAROLINA	22.484	17.242	18.328

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NORTH DAKOTA	FY 1995 COMPARABLE	FY 1996 COMPARABLE	FY 1997 REQUEST
ENERGY SUPPLY RESEARCH AND DEVELOPMENT ACTIVITIES			
Environmental Restoration and Waste Management			
Environmental Restoration	62	0	0
Supporting Research and Technical Analysis			
Basic Energy Sciences	107	37	40
TOTAL ENERGY SUPPLY RESEARCH AND DEVELOPMENT ACTIVITIES	169	37	40
WESTERN AREA POWER ADMIN. CONST., REHAB., OPER. & MAINT.			
Systems Operation and Maintenance			
WAPA - Operation and Maintenance	11,154	9,943	9,095
Program Direction - WP			
Program Direction - WP	6,833	6,973	6,542
TOTAL WESTERN AREA POWER ADMIN. CONST., REHAB., OPER. & MAINT.	17,987	16,916	15,637
FOSSIL ENERGY RESEARCH AND DEVELOPMENT			
Coal Research and Development			
Advanced Research and Tech. Development	0	150	0
Advanced Clean Fuels Research	0	200	0
Advanced Clean/Efficient Power Systems	202	0	725
TOTAL Coal Research and Development	202	350	725
Cooperative R&D Ventures			
Cooperative R&D	3,778	3,000	1,980
TOTAL FOSSIL ENERGY RESEARCH AND DEVELOPMENT	3,980	3,350	2,705
ENERGY CONSERVATION			
Building Technologies, State, & Community Sector			
Grants	2,610	1,411	2,003
TOTAL ENERGY CONSERVATION	2,610	1,411	2,003
TOTAL NORTH DAKOTA	24,746	21,714	20,385

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NORTHERN MARIANA ISL	FY 1995 COMPARABLE	FY 1996 COMPARABLE	FY 1997 REQUEST
ENERGY CONSERVATION			
Building Technologies, State, & Community Sector			
Grants.....	223	116	191
TOTAL ENERGY CONSERVATION.....	223	116	191
TOTAL NORTHERN MARIANA ISL.....	223	116	191

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OHIO

	FY 1995 COMPARABLE	FY 1996 COMPARABLE	FY 1997 REQUEST
ENERGY SUPPLY RESEARCH AND DEVELOPMENT ACTIVITIES			
Nuclear Fission			
Advanced Radioisotope Power Systems	8.850	7.880	6.750
Isotope Support	1.300	1.200	500
TOTAL Nuclear Fission	10.150	9.080	7.250
Environmental Restoration and Waste Management			
Environmental Restoration	28.792	15.652	12.267
Waste Management	124.723	115.389	123.601
Site Operations	974	1.061	1.223
TOTAL Environmental Restoration and Waste Management	154.489	132.102	137.091
Biological and Environmental Research			
Biological and Environmental Research	1.061	756	454
Supporting Research and Technical Analysis			
Basic Energy Sciences	2.186	1.954	1.948
Energy Research Analyses	140	0	0
TOTAL Supporting Research and Technical Analysis	2.326	1.954	1.948
In-House Energy Management			
In-House Energy Management	114	0	0
University & Science Education			
University & Science Education	153	25	0
TOTAL ENERGY SUPPLY RESEARCH AND DEVELOPMENT ACTIVITIES	168.293	143.917	146.743
URANIUM SUPPLY AND ENRICHMENT ACTIVITIES			
Uranium Supply and Enrichment Activities			
Uranium Supply and Enrichment Activities	28.551	20.363	17.510
Program Direction - NE	1	0	0
TOTAL Uranium Supply and Enrichment Activities	28.552	20.363	17.510
TOTAL URANIUM SUPPLY AND ENRICHMENT ACTIVITIES	28.552	20.363	17.510
URANIUM ENRICHMENT DECON. & DECOM. FUND			
Uranium Enrichment D & D Fund			
UE Decontamination & Decommissioning Fund	68.043	58.955	60.837
TOTAL URANIUM ENRICHMENT DECON. & DECOM. FUND	68.043	58.955	60.837
GENERAL SCIENCE AND RESEARCH ACTIVITIES			
High Energy Physics			
High Energy Physics	2.489	2.118	2.290
Nuclear Physics			
Nuclear Physics	769	805	790
TOTAL GENERAL SCIENCE AND RESEARCH ACTIVITIES	3.258	2.923	3.080
WEAPONS ACTIVITIES			
Program Direction			
Program Direction - DP	500	0	0
Stockpile Management			
Stockpile Management	6.95	5.120	22.533
Stockpile Stewardship			
Stockpile Stewardship	500	175	0
TOTAL WEAPONS ACTIVITIES	7.955	5.295	22.533

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OHIO	FY 1995 COMPARABLE	FY 1996 COMPARABLE	FY 1997 REQUEST
DEFENSE ENVIRONMENTAL RESTORATION & WASTE MANAGEMENT			
Environmental Restoration			
Environmental Restoration.....	243.115	274.805	287.175
Science and Technology			
Science and Technology.....	2.428	2.828	6.145
Site Operations			
Site Operations.....	93.724	98.141	86.342
Program Direction			
Program Direction - EM.....	22.703	29.505	28.450
TOTAL DEFENSE ENVIRONMENTAL RESTORATION & WASTE MANAGEMENT.....	361.970	405.279	408.112
OTHER DEFENSE ACTIVITIES			
Verification and Control Technology			
Arms Control.....	100	0	0
Nuclear Safeguards and Security			
Security Affairs.....	973	878	878
Worker and Community Transition			
Worker and Community Transition.....	11.400	1.100	0
TOTAL OTHER DEFENSE ACTIVITIES.....	12.473	1.978	878
DEPARTMENTAL ADMINISTRATION			
Human Resources & Administration			
Program Direction - HR.....	1.192	1.192	1.192
TOTAL DEPARTMENTAL ADMINISTRATION.....	1.192	1.192	1.192
OFFICE OF THE INSPECTOR GENERAL			
Office of the Inspector General			
Office of Inspector General.....	904	686	788
TOTAL OFFICE OF THE INSPECTOR GENERAL.....	904	686	788
FOSSIL ENERGY RESEARCH AND DEVELOPMENT			
Coal Research and Development			
Advanced Research and Tech. Development.....	200	166	150
Advanced Clean/Efficient Power Systems.....	20.174	18.885	13.160
TOTAL Coal Research and Development.....	20.374	19.051	13.310
TOTAL FOSSIL ENERGY RESEARCH AND DEVELOPMENT.....	20.374	19.051	13.310
ENERGY CONSERVATION			
Building Technologies, State, & Community Sector			
Grants.....	13.408	7.790	10.901
TOTAL ENERGY CONSERVATION.....	13.408	7.790	10.901
TOTAL OHIO.....	686.422	667.429	685.884

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OKLAHOMA	FY 1995 COMPARABLE	FY 1996 COMPARABLE	FY 1997 REQUEST
ENERGY SUPPLY RESEARCH AND DEVELOPMENT ACTIVITIES			
Biological and Environmental Research			
Biological and Environmental Research.....	128	100	100
Supporting Research and Technical Analysis			
Basic Energy Sciences.....	602	496	606
University & Science Education			
University & Science Education.....	162	0	0
TOTAL ENERGY SUPPLY RESEARCH AND DEVELOPMENT ACTIVITIES.....	892	596	706
GENERAL SCIENCE AND RESEARCH ACTIVITIES			
High Energy Physics			
High Energy Physics.....	651	781	789
TOTAL GENERAL SCIENCE AND RESEARCH ACTIVITIES.....	651	781	789
OTHER DEFENSE ACTIVITIES			
Worker and Community Transition			
Worker and Community Transition.....	150	0	0
TOTAL OTHER DEFENSE ACTIVITIES.....	150	0	0
DEPARTMENTAL ADMINISTRATION			
Human Resources & Administration			
Program Direction - HR.....	20	20	20
TOTAL DEPARTMENTAL ADMINISTRATION.....	20	20	20
SOUTHWESTERN POWER ADMIN. - OPERATION & MAINTENANCE			
Systems Operation and Maintenance			
SWPA - Operation and Maintenance.....	2,740	2,846	2,095
Purchase Power and Wheeling			
Purchase Power and Wheeling.....	1,503	1,630	1,095
Program Direction			
Program Direction - SW.....	16,984	17,740	17,862
TOTAL SOUTHWESTERN POWER ADMIN. - OPERATION & MAINTENANCE.....	21,227	22,216	21,052
FOSSIL ENERGY RESEARCH AND DEVELOPMENT			
Coal Research and Development			
Advanced Clean Fuels Research.....	40	0	0
Oil, Gas, and Shale Research and Development			
Natural Gas Research.....	1,577	2,281	4,325
Oil Technology.....	59,334	43,580	39,749
TOTAL Oil, Gas, and Shale Research and Development.....	60,911	45,861	44,074
Program Direction and Management Support			
Energy Technology Center Program Direction.....	3,391	3,017	8,500
Environmental Restoration			
Environmental Restoration - FE.....	1,666	4,025	3,166
Plant & Capital Equipment			
Plant - FE.....	847	0	0
Capital Equipment - FE.....	32	0	0
TOTAL Plant & Capital Equipment.....	879	0	0
TOTAL FOSSIL ENERGY RESEARCH AND DEVELOPMENT.....	66,887	52,903	55,740

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OKLAHOMA	FY 1995 COMPARABLE	FY 1996 COMPARABLE	FY 1997 REQUEST
ENERGY CONSERVATION			
Building Technologies, State, & Community Sector			
Grants.....	2.697	1.634	2.334
TOTAL ENERGY CONSERVATION.....	2.697	1.634	2.334
STRATEGIC PETROLEUM RESERVE			
SPR - Facilities Development			
SPR - Facilities Development.....	750	700	700
TOTAL STRATEGIC PETROLEUM RESERVE.....	750	700	700
TOTAL OKLAHOMA.....	93.274	78.850	81.341

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OREGON	FY 1995 COMPARABLE	FY 1996 COMPARABLE	FY 1997 REQUEST
ENERGY SUPPLY RESEARCH AND DEVELOPMENT ACTIVITIES			
Environmental Restoration and Waste Management			
Environmental Restoration.....	606	36	29
Biological and Environmental Research			
Biological and Environmental Research.....	6,107	989	265
Supporting Research and Technical Analysis			
Basic Energy Sciences.....	1,169	871	920
Energy Research Analyses.....	405	0	0
TOTAL Supporting Research and Technical Analysis.....	1,574	871	920
TOTAL ENERGY SUPPLY RESEARCH AND DEVELOPMENT ACTIVITIES.....	8,287	1,896	1,214
GENERAL SCIENCE AND RESEARCH ACTIVITIES			
High Energy Physics			
High Energy Physics.....	889	255	708
Nuclear Physics			
Nuclear Physics.....	240	296	307
TOTAL GENERAL SCIENCE AND RESEARCH ACTIVITIES	1,129	551	1,015
WEAPONS ACTIVITIES			
Stockpile Management			
Stockpile Management.....	7,630	6,550	4,235
TOTAL WEAPONS ACTIVITIES	7,630	6,550	4,235
DEPARTMENTAL ADMINISTRATION			
Human Resources & Administration			
Program Direction - HR.....	2	2	2
TOTAL DEPARTMENTAL ADMINISTRATION.....	2	2	2
OFFICE OF THE INSPECTOR GENERAL			
Office of the Inspector General			
Office of Inspector General.....	454	153	175
TOTAL OFFICE OF THE INSPECTOR GENERAL	454	153	175
BONNEVILLE POWER ADMINISTRATION FUND			
Bonneville Power Administration			
Bonneville Power Administration.....	1,455,486	1,644,885	1,705,608
TOTAL BONNEVILLE POWER ADMINISTRATION FUND.....	1,455,486	1,644,885	1,705,608
WESTERN AREA POWER ADMIN. CONST., REHAB. OPER. & MAINT.			
Systems Operation and Maintenance			
WAPA - Operation and Maintenance.....	23,987	19,176	16,736
TOTAL WESTERN AREA POWER ADMIN. CONST., REHAB. OPER. & MAINT	23,987	19,176	16,736
FOSSIL ENERGY RESEARCH AND DEVELOPMENT			
Mining			
Mining.....	0	0	5,000
TOTAL FOSSIL ENERGY RESEARCH AND DEVELOPMENT.....	0	0	5,000
ENERGY CONSERVATION			
Building Technologies, State, & Community Sector			
Grants	3,159	1,707	2,422
TOTAL ENERGY CONSERVATION.....	3,159	1,707	2,422
TOTAL OREGON.....	1,500,134	1,674,920	1,736,407

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PENNSYLVANIA

FY 1995
COMPARABLEFY 1996
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REQUEST

ENERGY SUPPLY RESEARCH AND DEVELOPMENT ACTIVITIES

Solar and Renewable Energy

Biofuels.....

240

0

0

Electric Energy Systems & Storage.....

0

0

10

TOTAL Solar and Renewable Energy.....

240

0

10

Nuclear Fission

Light Water Reactors.....

15,900

11,000

7,500

Environmental Restoration and Waste Management

Environmental Restoration.....

2,089

307

299

Biological and Environmental Research

Biological and Environmental Research.....

2,681

1,666

1,673

Magnetic Fusion

Fusion Energy Research.....

50

190

50

Supporting Research and Technical Analysis

Basic Energy Sciences.....

6,139

5,228

5,323

Energy Research Analyses.....

193

0

0

Computational & Technology Research.....

29

155

0

TOTAL Supporting Research and Technical Analysis.....

6,361

5,383

5,323

In-House Energy Management

In-House Energy Management.....

50

0

0

TOTAL ENERGY SUPPLY RESEARCH AND DEVELOPMENT ACTIVITIES.....

27,371

18,546

14,855

GENERAL SCIENCE AND RESEARCH ACTIVITIES

High Energy Physics

High Energy Physics.....

5,478

5,243

5,763

Nuclear Physics

Nuclear Physics.....

2,149

1,963

1,702

TOTAL GENERAL SCIENCE AND RESEARCH ACTIVITIES.....

7,627

7,206

7,465

DEFENSE ENVIRONMENTAL RESTORATION & WASTE MANAGEMENT

Science and Technology

Science and Technology.....

9,925

13,815

10,930

Site Operations

Site Operations.....

160

75

0

Program Direction

Program Direction - EM.....

332

638

3,589

TOTAL DEFENSE ENVIRONMENTAL RESTORATION & WASTE MANAGEMENT.....

10,417

14,528

14,519

OTHER DEFENSE ACTIVITIES

Security Investigations

Security Investigations.....

2,292

0

1,100

Naval Reactors

Naval Reactors Development.....

287,258

278,498

279,130

Program Direction - NE.....

6,089

3,832

5,170

TOTAL Naval Reactors.....

293,347

282,330

284,300

Worker and Community Transition

Worker and Community Transition.....

250

225

0

TOTAL OTHER DEFENSE ACTIVITIES.....

295,889

282,555

285,400

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PENNSYLVANIA

	FY 1995 COMPARABLE	FY 1996 COMPARABLE	FY 1997 REQUEST
DEPARTMENTAL ADMINISTRATION			
Human Resources & Administration			
Program Direction - HR.....	2.712	2.712	2.712
TOTAL DEPARTMENTAL ADMINISTRATION.....	2.712	2.712	2.712
OFFICE OF THE INSPECTOR GENERAL			
Office of the Inspector General			
Office of Inspector General.....	1.176	915	1.050
TOTAL OFFICE OF THE INSPECTOR GENERAL.....	1.176	915	1.050
BONNEVILLE POWER ADMINISTRATION FUND			
Bonneville Power Administration			
Bonneville Power Administration.....	106	123	117
TOTAL BONNEVILLE POWER ADMINISTRATION FUND.....	106	123	117
FOSSIL ENERGY RESEARCH AND DEVELOPMENT			
Coal Research and Development			
Advanced Research and Tech. Development.....	4.460	3.649	3.048
Advanced Clean Fuels Research.....	19.723	12.661	10.662
Advanced Clean/Efficient Power Systems.....	13.837	10.245	11.467
TOTAL Coal Research and Development.....	38.020	26.555	25.177
Oil, Gas, and Shale Research and Development			
Natural Gas Research.....	232	621	350
Fuel Cells.....	15.910	12.949	12.375
TOTAL Oil, Gas, and Shale Research and Development.....	16.142	13.570	12.725
Program Direction and Management Support			
Energy Technology Center Program Direction.....	26.904	25.257	17.451
Environmental Restoration			
Environmental Restoration - FE.....	5.594	4.248	6.510
Plant & Capital Equipment			
Plant - FE.....	947	0	0
Capital Equipment - FE.....	222	0	0
TOTAL Plant & Capital Equipment.....	1.169	0	0
Mining			
Mining.....	0	40.000	0
TOTAL FOSSIL ENERGY RESEARCH AND DEVELOPMENT.....	87.829	109.630	61.863
ENERGY CONSERVATION			
Building Technologies, State, & Community Sector			
Grants.....	14.284	8.372	11.719
Industrial Technologies			
Industry Sector.....	9.404	7.573	13.471
Transportation Technologies			
Transportation Sector.....	999	0	0
Federal Energy Management Program			
Federal Energy Management Program.....	35	40	50
TOTAL ENERGY CONSERVATION.....	24.722	15.985	25.240

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PENNSYLVANIA	FY 1995 COMPARABLE	FY 1996 COMPARABLE	FY 1997 REQUEST
ENERGY INFORMATION ADMINISTRATION			
Energy Information Administration			
National Energy Information System	3,775	3,209	2,728
TOTAL ENERGY INFORMATION ADMINISTRATION	3,775	3,209	2,728
TOTAL PENNSYLVANIA	461,624	455,409	415,949

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PUERTO RICO	FY 1995 COMPARABLE	FY 1996 COMPARABLE	FY 1997 REQUEST
GENERAL SCIENCE AND RESEARCH ACTIVITIES			
High Energy Physics			
High Energy Physics.....	32	74	36
TOTAL GENERAL SCIENCE AND RESEARCH ACTIVITIES.....	32	74	36
ENERGY CONSERVATION			
Building Technologies, State, & Community Sector			
Grants.....	662	328	496
TOTAL ENERGY CONSERVATION.....	662	328	496
TOTAL PUERTO RICO.....	694	402	532

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RHODE ISLAND

	FY 1995 COMPARABLE	FY 1996 COMPARABLE	FY 1997 REQUEST
ENERGY SUPPLY RESEARCH AND DEVELOPMENT ACTIVITIES			
Biological and Environmental Research	455	521	520
Supporting Research and Technical Analysis			
Basic Energy Sciences	676	506	485
Computational & Technology Research	110	100	0
TOTAL Supporting Research and Technical Analysis	786	606	485
TOTAL ENERGY SUPPLY RESEARCH AND DEVELOPMENT ACTIVITIES	1,241	1,127	1,005
GENERAL SCIENCE AND RESEARCH ACTIVITIES			
High Energy Physics			
High Energy Physics	1,065	1,084	1,244
TOTAL GENERAL SCIENCE AND RESEARCH ACTIVITIES	1,065	1,084	1,244
ENERGY CONSERVATION			
Building Technologies, State, & Community Sector			
Grants	1,351	771	1,101
TOTAL ENERGY CONSERVATION	1,351	771	1,101
TOTAL RHODE ISLAND	3,657	2,982	3,350

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SOUTH CAROLINA	FY 1995 COMPARABLE	FY 1996 COMPARABLE	FY 1997 REQUEST
ENERGY SUPPLY RESEARCH AND DEVELOPMENT ACTIVITIES			
Nuclear Fission			
Advanced Radioisotope Power Systems	13.980	9.860	700
Environment, Safety and Health			
Environment, Safety and Health	191	173	161
Environmental Restoration and Waste Management			
Environmental Restoration	292	4.300	4.300
Biological and Environmental Research			
Biological and Environmental Research	148	148	0
Magnetic Fusion			
Fusion Energy Research	756	564	800
Supporting Research and Technical Analysis			
Basic Energy Sciences	838	668	778
Computational & Technology Research	220	229	100
TOTAL Supporting Research and Technical Analysis	1.058	897	878
In-House Energy Management			
In-House Energy Management	143	0	0
University & Science Education			
University & Science Education	296	105	100
TOTAL ENERGY SUPPLY RESEARCH AND DEVELOPMENT ACTIVITIES	16.864	16.047	6.939
GENERAL SCIENCE AND RESEARCH ACTIVITIES			
High Energy Physics			
High Energy Physics	388	278	208
TOTAL GENERAL SCIENCE AND RESEARCH ACTIVITIES	388	278	208
WEAPONS ACTIVITIES			
Program Direction			
Program Direction - DP	4.325	2.865	2.855
Stockpile Management			
Stockpile Management	123.701	153.385	102.620
Stockpile Stewardship			
Stockpile Stewardship	1.576	1.358	780
TOTAL WEAPONS ACTIVITIES	129.602	157.608	106.255
DEFENSE ENVIRONMENTAL RESTORATION & WASTE MANAGEMENT			
Environmental Restoration			
Environmental Restoration	110.169	99.818	107.457
Waste Management			
Waste Management	614.932	532.156	485.380
Science and Technology			
Science and Technology	17.706	29.388	26.575
Site Operations			
Site Operations	135.727	88.333	54.309
Program Direction			
Program Direction - EM	79.051	75.520	66.531

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SOUTH CAROLINA

	FY 1995 COMPARABLE	FY 1996 COMPARABLE	FY 1997 REQUEST
Nuclear Materials & Facilities Stabilization			
Nuclear Materials & Facilities Stabilization.....	588.489	462.145	433.569
Policy and Management			
Policy and Management.....	0	625	800
TOTAL DEFENSE ENVIRONMENTAL RESTORATION & WASTE MANAGEMENT.....	1,546.074	1,287.985	1,174.621
OTHER DEFENSE ACTIVITIES			
Verification and Control Technology			
Arms Control.....	243	680	625
Intelligence.....	555	500	470
Nonproliferation & Verification R&D.....	2,265	3,062	1,550
TOTAL Verification and Control Technology.....	3,063	4,242	2,645
Nuclear Safeguards and Security			
Security Affairs.....	10,029	8,629	8,500
Security Investigations			
Security Investigations.....	3,050	2,507	2,000
Worker and Community Transition			
Worker and Community Transition.....	31.847	0	0
Fissile Materials Control & Disposition			
Fissile Materials Control & Disposition.....	1,555	1,535	0
TOTAL OTHER DEFENSE ACTIVITIES.....	49,544	16,913	13,145
DEPARTMENTAL ADMINISTRATION			
Cost of Work for Others			
Cost of Work for Others.....	3,500	3,000	3,000
Human Resources & Administration			
Program Direction - HR.....	3	3	3
TOTAL DEPARTMENTAL ADMINISTRATION.....	3,503	3,003	3,003
OFFICE OF THE INSPECTOR GENERAL			
Office of the Inspector General			
Office of Inspector General.....	1,627	1,372	1,489
TOTAL OFFICE OF THE INSPECTOR GENERAL.....	1,627	1,372	1,489
SOUTHEASTERN POWER ADMIN. - OPERATION & MAINTENANCE			
Purchase Power and Wheeling			
Purchase Power and Wheeling.....	2,786	2,377	3,121
TOTAL SOUTHEASTERN POWER ADMIN. - OPERATION & MAINTENANCE.....	2,786	2,377	3,121
FOSSIL ENERGY RESEARCH AND DEVELOPMENT			
Coal Research and Development			
Advanced Clean/Efficient Power Systems.....	4,782	0	0
Oil, Gas, and Shale Research and Development			
Natural Gas Research.....	4,800	4,600	5,000
TOTAL FOSSIL ENERGY RESEARCH AND DEVELOPMENT.....	9,582	4,600	5,000
ENERGY CONSERVATION			
Building Technologies, State, & Community Sector			
Grants.....	1,910	1,216	1,755
TOTAL ENERGY CONSERVATION.....	1,910	1,216	1,755
TOTAL SOUTH CAROLINA.....	1,761,880	1,491,399	1,315,536

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SOUTH DAKOTA	FY 1995 COMPARABLE	FY 1996 COMPARABLE	FY 1997 REQUEST
ENERGY SUPPLY RESEARCH AND DEVELOPMENT ACTIVITIES			
Supporting Research and Technical Analysis			
Basic Energy Sciences.....	80	0	0
TOTAL ENERGY SUPPLY RESEARCH AND DEVELOPMENT ACTIVITIES.....	80	0	0
WESTERN AREA POWER ADMIN. CONST. REHAB. OPER. & MAINT.			
Systems Operation and Maintenance			
WAPA - Operation and Maintenance.....	12.227	11.245	11.003
Program Direction - WP			
Program Direction - WP.....	13.665	14.946	13.083
TOTAL WESTERN AREA POWER ADMIN. CONST. REHAB. OPER. & MAINT.....	25.892	26.191	24.086
ENERGY CONSERVATION			
Building Technologies, State, & Community Sector			
Grants.....	2.031	1.109	1.579
TOTAL ENERGY CONSERVATION.....	2.031	1.109	1.579
TOTAL SOUTH DAKOTA.....	28.003	27.300	25.665

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TENNESSEE

	FY 1995 COMPARABLE	FY 1996 COMPARABLE	FY 1997 REQUEST
ENERGY SUPPLY RESEARCH AND DEVELOPMENT ACTIVITIES			
Solar and Renewable Energy			
Biofuels	6,255	6,320	7,700
Geothermal Energy R&D	49	50	50
Electric Energy Systems & Storage	13,069	8,092	7,600
Hydrogen Research R&D	400	485	276
TOTAL Solar and Renewable Energy	19,773	14,947	15,626
Nuclear Fission			
Light Water Reactors	648	38	0
Advanced Reactor R&D	1,364	0	0
Space Reactor Power Systems	5	0	0
Advanced Radioisotope Power Systems	5,808	3,730	3,060
Oak Ridge Landlord	14,224	14,400	16,000
Program Direction - NE	2,420	1,304	1,264
Termination Costs	1,112	1,035	2,500
Isotope Support	3,684	2,200	2,000
TOTAL Nuclear Fission	29,265	22,707	24,824
Environment, Safety and Health			
Environment, Safety and Health	23,630	21,624	20,147
Environmental Restoration and Waste Management			
Environmental Restoration	52,005	36,189	42,012
Waste Management	51,505	11,157	14,414
Nuclear Materials & Facilities Stabilization	9,668	13,913	14,638
TOTAL Environmental Restoration and Waste Management	113,178	61,259	71,064
Biological and Environmental Research			
Biological and Environmental Research	32,414	26,939	29,049
Magnetic Fusion			
Fusion Energy Research	28,963	20,477	19,300
Supporting Research and Technical Analysis			
Basic Energy Sciences	85,431	87,166	92,234
Advanced Neutron Source	12,832	0	0
Energy Research Analyses	644	394	0
Computational & Technology Research	23,180	13,840	11,969
TOTAL Supporting Research and Technical Analysis	122,087	101,400	104,203
Multiprogram Facilities Support			
Multiprogram Energy Labs - Facilities Support	4,479	4,024	2,635
In-House Energy Management			
In-House Energy Management	12,162	0	1,000
Technical Information Management Program			
Technical Information Management Program	5,795	3,176	3,300
Program Direction	10,200	8,800	8,700
TOTAL Technical Information Management Program	15,995	11,976	12,000
Program Direction - ER			
Program Direction - ER	175	0	0
University & Science Education			
University & Science Education	12,838	5,219	4,500

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	FY 1995 COMPARABLE	FY 1996 COMPARABLE	FY 1997 REQUEST
Field Offices and Management			
Oak Ridge Operations Office.....	37.175	33.530	36.484
TOTAL ENERGY SUPPLY RESEARCH AND DEVELOPMENT ACTIVITIES.....	452.134	324.102	340.832
URANIUM SUPPLY AND ENRICHMENT ACTIVITIES			
Uranium Supply and Enrichment Activities			
Uranium Supply and Enrichment Activities.....	21.986	31.630	28.920
Program Direction - NE.....	2.430	2.000	2.734
TOTAL Uranium Supply and Enrichment Activities.....	24.416	33.630	31.654
TOTAL URANIUM SUPPLY AND ENRICHMENT ACTIVITIES.....	24.416	33.630	31.654
URANIUM ENRICHMENT DECON. & DECOM. FUND			
Uranium Enrichment O & D Fund			
UE Decontamination & Decommissioning Fund.....	137.716	129.549	103.053
TOTAL URANIUM ENRICHMENT DECON. & DECOM. FUND.....	137.716	129.549	103.053
GENERAL SCIENCE AND RESEARCH ACTIVITIES			
High Energy Physics			
High Energy Physics.....	1.033	870	1.078
Nuclear Physics			
Nuclear Physics.....	14.630	15.698	16.342
General Science Program Direction			
General Science Program Direction.....	979	874	844
TOTAL GENERAL SCIENCE AND RESEARCH ACTIVITIES.....	16.642	17.442	18.264
WEAPONS ACTIVITIES			
Program Direction			
Program Direction - DP.....	14.696	10.040	11.595
Stockpile Management			
Stockpile Management.....	352.728	402.675	383.912
Stockpile Stewardship			
Stockpile Stewardship.....	30.568	18.975	6.230
TOTAL WEAPONS ACTIVITIES.....	397.992	431.690	401.737
DEFENSE ENVIRONMENTAL RESTORATION & WASTE MANAGEMENT			
Environmental Restoration			
Environmental Restoration.....	81.369	86.389	76.488
Waste Management			
Waste Management.....	196.634	191.887	164.028
Science and Technology			
Science and Technology.....	27.317	27.566	21.068
Site Operations			
Site Operations.....	8.065	5.590	5.289
Program Direction			
Program Direction - EM.....	20.380	20.835	19.477
Nuclear Materials & Facilities Stabilization			
Nuclear Materials & Facilities Stabilization.....	1.900	1.981	1.737

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	FY 1995 COMPARABLE	FY 1996 COMPARABLE	FY 1997 REQUEST
Policy and Management			
Policy and Management.....	30	250	260
Environmental Management Science Program			
Environmental Management Science Program.....	0	550	0
TOTAL DEFENSE ENVIRONMENTAL RESTORATION & WASTE MANAGEMENT.....	335.695	335.048	288.347
OTHER DEFENSE ACTIVITIES			
Verification and Control Technology			
Arms Control.....	4.549	14.706	19.635
Intelligence.....	2.349	2.248	2.125
Nonproliferation & Verification R&D.....	5.551	4.828	3.190
TOTAL Verification and Control Technology.....	12.449	21.782	24.950
Nuclear Safeguards and Security			
Security Affairs.....	4.567	3.739	3.493
Security Investigations			
Security Investigations.....	5.500	385	3,185
Naval Reactors			
Enriched Materials.....	32.000	0	0
Worker and Community Transition			
Worker and Community Transition.....	2.932	428	0
Fissile Materials Control & Disposition			
Fissile Materials Control & Disposition.....	7.882	15.010	14.150
Emergency Management			
Emergency Management.....	1.850	1.800	1.800
Environment, Safety, and Health			
Environment, Safety, and Health.....	613	280	280
TOTAL OTHER DEFENSE ACTIVITIES.....	67.793	43.424	47.858
DEPARTMENTAL ADMINISTRATION			
Office of Policy			
Environmental Policy Studies.....	552	364	0
Cost of Work for Others			
Cost of Work for Others.....	7.234	5.317	3,663
Human Resources & Administration			
Program Direction - HR.....	983	936	936
Economic Impact & Diversity			
Minority Economic Impact.....	695	54	104
TOTAL DEPARTMENTAL ADMINISTRATION.....	9.464	6.671	4.703
OFFICE OF THE INSPECTOR GENERAL			
Office of the Inspector General			
Office of Inspector General.....	3,761	2,824	2,974
TOTAL OFFICE OF THE INSPECTOR GENERAL.....	3,761	2,824	2,974
SOUTHEASTERN POWER ADMIN - OPERATION & MAINTENANCE			
Purchase Power and Wheeling			
Purchase Power and Wheeling.....	5.033	7.000	7.000
TOTAL SOUTHEASTERN POWER ADMIN - OPERATION & MAINTENANCE.....	5.033	7.000	7.000

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TENNESSEE

	FY 1995 COMPARABLE	FY 1996 COMPARABLE	FY 1997 REQUEST
FOSSIL ENERGY RESEARCH AND DEVELOPMENT			
Coal Research and Development			
Advanced Research and Tech. Development.....	6.542	5.627	4.242
Advanced Clean/Efficient Power Systems.....	20	0	0
TOTAL Coal Research and Development.....	6.562	5.627	4.242
Oil, Gas, and Shale Research and Development			
Natural Gas Research.....	1.000	1.500	1.500
TOTAL FOSSIL ENERGY RESEARCH AND DEVELOPMENT.....	7.562	7.127	5.742
ENERGY CONSERVATION			
Building Technologies, State, & Community Sector			
Research & Development.....	18.011	16.946	20.510
Grants.....	4.896	2.932	3.592
TOTAL Building Technologies, State, & Community Sector.....	22.907	19.878	24.102
Industrial Technologies			
Industry Sector.....	19.589	21.869	20.018
Transportation Technologies			
Transportation Sector.....	34.785	32.919	38.884
Utility Technologies			
Utility Sector.....	1.000	0	0
Policy and Management			
Policy and Management - EE.....	444	1.100	847
Federal Energy Management Program			
Federal Energy Management Program.....	165	800	1.500
TOTAL ENERGY CONSERVATION.....	78.890	76.566	85.351
NUCLEAR WASTE FUND			
Nuclear Waste Disposal Fund			
Nuclear Waste Fund.....	1.467	280	290
Program Direction - RW.....	89	71	0
TOTAL Nuclear Waste Disposal Fund.....	1.556	351	290
TOTAL NUCLEAR WASTE FUND.....	1.556	351	290
STRATEGIC PETROLEUM RESERVE			
SPR - Facilities Development			
SPR - Facilities Development.....	125	100	100
TOTAL STRATEGIC PETROLEUM RESERVE.....	125	100	100
ENERGY INFORMATION ADMINISTRATION			
Energy Information Administration			
National Energy Information System.....	213	181	154
TOTAL ENERGY INFORMATION ADMINISTRATION.....	213	181	154
TOTAL TENNESSEE.....	1,538,992	1,415,705	1,338,059

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TEXAS

	FY 1995 COMPARABLE	FY 1996 COMPARABLE	FY 1997 REQUEST
ENERGY SUPPLY RESEARCH AND DEVELOPMENT ACTIVITIES			
Environmental Restoration and Waste Management			
Environmental Restoration.....	1,382	1,654	458
Biological and Environmental Research			
Biological and Environmental Research.....	2,845	2,325	1,814
Magnetic Fusion			
Fusion Energy Research.....	7,187	3,325	1,725
Supporting Research and Technical Analysis			
Basic Energy Sciences.....	3,843	3,178	3,178
Computational & Technology Research.....	1,858	1,679	810
TOTAL Supporting Research and Technical Analysis.....	5,701	4,857	3,988
In-House Energy Management			
In-House Energy Management.....	100	0	0
TOTAL ENERGY SUPPLY RESEARCH AND DEVELOPMENT ACTIVITIES.....	17,215	12,161	7,985
GENERAL SCIENCE AND RESEARCH ACTIVITIES			
High Energy Physics			
High Energy Physics.....	3,434	4,129	3,495
Nuclear Physics			
Nuclear Physics.....	4,096	4,080	3,850
TOTAL GENERAL SCIENCE AND RESEARCH ACTIVITIES.....	7,530	8,209	7,345
WEAPONS ACTIVITIES			
Program Direction			
Program Direction - DP.....	1,750	0	0
Stockpile Management			
Stockpile Management.....	252,425	281,120	264,959
Stockpile Stewardship			
Stockpile Stewardship.....	150	175	0
TOTAL WEAPONS ACTIVITIES.....	254,325	281,295	264,959
DEFENSE ENVIRONMENTAL RESTORATION & WASTE MANAGEMENT			
Environmental Restoration			
Environmental Restoration.....	20,377	12,832	9,075
Waste Management			
Waste Management.....	12,612	11,249	11,047
TOTAL DEFENSE ENVIRONMENTAL RESTORATION & WASTE MANAGEMENT.....	32,989	24,081	20,122
OTHER DEFENSE ACTIVITIES			
Verification and Control Technology			
Arms Control.....	260	575	625
Intelligence.....	120	120	100
TOTAL Verification and Control Technology.....	380	695	725
Fissile Materials Control & Disposition			
Fissile Materials Control & Disposition.....	9,000	10,000	5,000
TOTAL OTHER DEFENSE ACTIVITIES.....	9,380	10,695	5,725

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TEXAS	FY 1995 COMPARABLE	FY 1996 COMPARABLE	FY 1997 REQUEST
DEPARTMENTAL ADMINISTRATION			
Human Resources & Administration			
Program Direction - HR.....	1	1	1
TOTAL DEPARTMENTAL ADMINISTRATION.....	1	1	1
OFFICE OF THE INSPECTOR GENERAL			
Office of the Inspector General			
Office of Inspector General.....	180	0	0
TOTAL OFFICE OF THE INSPECTOR GENERAL.....	180	0	0
FALCON & AMISTAD - OPERATION & MAINTENANCE FUND			
Falcon & Amistad Operating and Maintenance Fund			
FA - Operation and Maintenance.....	0	979	949
TOTAL FALCON & AMISTAD - OPERATION & MAINTENANCE FUND.....	0	979	949
FOSSIL ENERGY RESEARCH AND DEVELOPMENT			
Coal Research and Development			
Advanced Clean Fuels Research.....	0	172	0
Advanced Clean/Efficient Power Systems.....	350	1,235	1,657
TOTAL Coal Research and Development.....	350	1,407	1,657
Oil, Gas, and Shale Research and Development			
Natural Gas Research.....	475	600	650
Oil Technology.....	572	55	460
TOTAL Oil, Gas, and Shale Research and Development.....	1,047	655	1,110
TOTAL FOSSIL ENERGY RESEARCH AND DEVELOPMENT.....	1,397	2,062	2,767
ENERGY CONSERVATION			
Building Technologies, State, & Community Sector			
Grants.....	5,882	4,074	5,999
Transportation Technologies			
Transportation Sector.....	453	0	0
Federal Energy Management Program			
Federal Energy Management Program.....	15	0	0
TOTAL ENERGY CONSERVATION.....	6,350	4,074	5,999
ECONOMIC REGULATION			
Economic Regulation			
Compliance.....	512	113	0
TOTAL ECONOMIC REGULATION.....	512	113	0
STRATEGIC PETROLEUM RESERVE			
SPR - Facilities Development			
SPR - Facilities Development.....	60,361	59,627	77,122
TOTAL STRATEGIC PETROLEUM RESERVE.....	60,361	59,627	77,122
ENERGY INFORMATION ADMINISTRATION			
Energy Information Administration			
National Energy Information System.....	137	93	90
TOTAL ENERGY INFORMATION ADMINISTRATION.....	137	93	90
TOTAL TEXAS	390,377	403,390	393,064

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TRUST TERRITORIES	FY 1995 COMPARABLE	FY 1996 COMPARABLE	FY 1997 REQUEST
ENERGY CONSERVATION			
Building Technologies, State, & Community Sector			
Grants.....	130	65	0
TOTAL ENERGY CONSERVATION.....	130	65	0
TOTAL TRUST TERRITORIES.....	130	65	0

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UTAH	FY 1995 COMPARABLE	FY 1996 COMPARABLE	FY 1997 REQUEST
ENERGY SUPPLY RESEARCH AND DEVELOPMENT ACTIVITIES			
Environmental Restoration and Waste Management			
Environmental Restoration.....	2.504	2.309	1.087
Biological and Environmental Research			
Biological and Environmental Research.....	1.698	1.615	836
Supporting Research and Technical Analysis			
Basic Energy Sciences.....	1.468	1.121	1.311
Computational & Technology Research.....	5	0	0
TOTAL Supporting Research and Technical Analysis.....	1.473	1.121	1.311
University & Science Education			
University & Science Education.....	5.194	2.170	2.000
TOTAL ENERGY SUPPLY RESEARCH AND DEVELOPMENT ACTIVITIES.....	10.869	7.215	5.234
FALCON & AMISTAD - OPERATION & MAINTENANCE FUND			
Falcon & Amistad Operating and Maintenance Fund			
FA - Operation and Maintenance.....	0	21	21
TOTAL FALCON & AMISTAD - OPERATION & MAINTENANCE FUND.....	0	21	21
WESTERN AREA POWER ADMIN. CONST., REHAB., OPER. & MAINT.			
Systems Operation and Maintenance			
WAPA - Operation and Maintenance.....	813	464	318
TOTAL WESTERN AREA POWER ADMIN. CONST., REHAB., OPER. & MAINT.....	813	464	318
COLORADO RIVER BASINS POWER MARKETING FUND (WAPA)			
Colorado River Storage Project			
Colorado River Basins Fund.....	42.064	54.888	48.131
Program Direction			
Program Direction.....	5.248	5.422	5.732
TOTAL COLORADO RIVER BASINS POWER MARKETING FUND (WAPA).....	47.312	60.310	53.863
FOSSIL ENERGY RESEARCH AND DEVELOPMENT			
Coal Research and Development			
Advanced Clean Fuels Research.....	266	0	240
TOTAL FOSSIL ENERGY RESEARCH AND DEVELOPMENT.....	266	0	240
NAVAL PETROLEUM AND OIL SHALE RESERVES			
Naval Petroleum and Oil Shale Reserves			
Naval Petroleum and Oil Shale Reserves.....	32	0	35
TOTAL NAVAL PETROLEUM AND OIL SHALE RESERVES.....	32	0	35
ENERGY CONSERVATION			
Building Technologies, State, & Community Sector			
Grants.....	2.347	1.283	1.827
TOTAL ENERGY CONSERVATION.....	2.347	1.283	1.827
TOTAL UTAH.....	61.639	69.293	61.538

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VERMONT	FY 1995 COMPARABLE	FY 1996 COMPARABLE	FY 1997 REQUEST
ENERGY SUPPLY RESEARCH AND DEVELOPMENT ACTIVITIES			
Biological and Environmental Research			
Biological and Environmental Research.....	534	500	534
TOTAL ENERGY SUPPLY RESEARCH AND DEVELOPMENT ACTIVITIES.....	534	500	534
ENERGY CONSERVATION			
Building Technologies, State, & Community Sector			
Grants.....	1,441	805	1,146
TOTAL ENERGY CONSERVATION.....	1,441	805	1,146
TOTAL VERMONT.....	1,975	1,305	1,680

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VIRGINIA	FY 1995 COMPARABLE	FY 1996 COMPARABLE	FY 1997 REQUEST
ENERGY SUPPLY RESEARCH AND DEVELOPMENT ACTIVITIES			
Nuclear Fission			
Light Water Reactors.....	167	175	0
Biological and Environmental Research			
Biological and Environmental Research.....	2,588	2,358	2,425
Magnetic Fusion			
Fusion Energy Research.....	528	93	85
Supporting Research and Technical Analysis			
Basic Energy Sciences.....	1,933	1,902	1,691
Energy Research Analyses.....	150	0	0
Computational & Technology Research.....	1,338	930	1,110
TOTAL Supporting Research and Technical Analysis.....	3,421	2,832	2,801
University & Science Education			
University & Science Education.....	593	100	150
TOTAL ENERGY SUPPLY RESEARCH AND DEVELOPMENT ACTIVITIES.....	7,297	5,558	5,461
GENERAL SCIENCE AND RESEARCH ACTIVITIES			
High Energy Physics			
High Energy Physics.....	1,776	2,010	2,051
Nuclear Physics			
Nuclear Physics.....	71,010	69,600	71,100
TOTAL GENERAL SCIENCE AND RESEARCH ACTIVITIES.....	72,786	71,610	73,151
DEPARTMENTAL ADMINISTRATION			
Human Resources & Administration			
Program Direction - HR.....	24,247	9,892	28,086
TOTAL DEPARTMENTAL ADMINISTRATION.....	24,247	9,892	28,086
SOUTHEASTERN POWER ADMIN. - OPERATION & MAINTENANCE			
Purchase Power and Wheeling			
Purchase Power and Wheeling.....	3,285	2,933	3,133
TOTAL SOUTHEASTERN POWER ADMIN. - OPERATION & MAINTENANCE.....	3,285	2,933	3,133
FOSSIL ENERGY RESEARCH AND DEVELOPMENT			
Coal Research and Development			
Advanced Research and Tech. Development.....	1,150	1,622	1,535
Advanced Clean Fuels Research.....	1,082	514	735
Advanced Clean/Efficient Power Systems.....	0	75	0
TOTAL Coal Research and Development.....	2,232	2,211	2,270
Oil, Gas, and Shale Research and Development			
Natural Gas Research.....	2,913	3,115	1,495
TOTAL FOSSIL ENERGY RESEARCH AND DEVELOPMENT.....	5,145	5,326	3,765
ENERGY CONSERVATION			
Building Technologies, State, & Community Sector			
Grants.....	4,299	2,544	3,597
Industrial Technologies			
Industry Sector.....	0	225	200
TOTAL ENERGY CONSERVATION.....	4,299	2,769	3,797

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VIRGINIA	FY 1995 COMPARABLE	FY 1996 COMPARABLE	FY 1997 REQUEST
ENERGY INFORMATION ADMINISTRATION			
Energy Information Administration			
National Energy Information System.....	5.366	4.388	3.366
TOTAL ENERGY INFORMATION ADMINISTRATION.....	5.366	4.388	3.366
TOTAL VIRGINIA.....	122.425	102.476	120.759

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VIRGIN ISLANDS	FY 1995 COMPARABLE	FY 1996 COMPARABLE	FY 1997 REQUEST
ENERGY CONSERVATION			
Building Technologies, State, & Community Sector			
Grants.....	249	124	200
TOTAL ENERGY CONSERVATION.....	249	124	200
TOTAL VIRGIN ISLANDS.....	249	124	200

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WASHINGTON

	FY 1995 COMPARABLE	FY 1996 COMPARABLE	FY 1997 REQUEST
ENERGY SUPPLY RESEARCH AND DEVELOPMENT ACTIVITIES			
Solar and Renewable Energy			
Biofuels.....	845	590	295
Wind Energy.....	300	0	0
Electric Energy Systems & Storage.....	1,645	1,000	710
Hydrogen Research R&D.....	147	0	0
Solar and Renewable Energy Deployment.....	0	300	100
TOTAL Solar and Renewable Energy.....	2,937	1,890	1,105
Nuclear Fission			
Advanced Radioisotope Power Systems.....	5,995	3,175	400
Program Direction - NE.....	2,853	512	442
Civilian Radioactive Waste R&D.....	301	0	0
Isotope Support.....	1,200	1,175	750
TOTAL Nuclear Fission.....	10,349	4,862	1,592
Environment, Safety and Health			
Environment, Safety and Health.....	9,792	9,000	7,466
Environmental Restoration and Waste Management			
Waste Management.....	18,178	11,550	11,506
Nuclear Materials & Facilities Stabilization.....	63,436	49,289	47,526
TOTAL Environmental Restoration and Waste Management.....	81,614	60,839	59,032
Biological and Environmental Research			
Biological and Environmental Research.....	90,330	97,087	89,026
Magnetic Fusion			
Fusion Energy Research.....	4,094	2,857	4,390
Supporting Research and Technical Analysis			
Basic Energy Sciences.....	13,625	13,440	13,209
Energy Research Analyses.....	465	250	0
Computational & Technology Research.....	9,694	4,016	4,465
TOTAL Supporting Research and Technical Analysis.....	23,784	17,706	17,674
Multiprogram Facilities Support			
Multiprogram Energy Labs - Facilities Support.....	3,870	4,740	5,090
In-House Energy Management			
In-House Energy Management.....	1,014	0	0
University & Science Education			
University & Science Education.....	2,167	380	450
TOTAL ENERGY SUPPLY RESEARCH AND DEVELOPMENT ACTIVITIES.....	229,951	199,361	185,825
URANIUM SUPPLY AND ENRICHMENT ACTIVITIES			
Uranium Supply and Enrichment Activities			
Uranium Supply and Enrichment Activities.....	100	570	0
TOTAL URANIUM SUPPLY AND ENRICHMENT ACTIVITIES.....	100	570	0
GENERAL SCIENCE AND RESEARCH ACTIVITIES			
High Energy Physics			
High Energy Physics.....	1,563	1,515	1,655
Nuclear Physics			
Nuclear Physics.....	8,101	4,765	5,687
TOTAL GENERAL SCIENCE AND RESEARCH ACTIVITIES.....	9,664	6,280	7,342

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WASHINGTON	FY 1995 COMPARABLE	FY 1996 COMPARABLE	FY 1997 REQUEST
WEAPONS ACTIVITIES			
Program Direction			
Program Direction - DP.	3.616	1.480	1.735
Stockpile Management			
Stockpile Management..	21.631	26.384	23.899
Stockpile Stewardship			
Stockpile Stewardship..	3.000	0	0
TOTAL WEAPONS ACTIVITIES	28.247	27.864	25.634
DEFENSE ENVIRONMENTAL RESTORATION & WASTE MANAGEMENT			
Environmental Restoration			
Environmental Restoration....	177.081	157.433	130.799
Waste Management			
Waste Management.	839.910	678.332	465.027
Science and Technology			
Science and Technology	36.188	29.896	37.183
Site Operations			
Site Operations....	69.942	67.527	50.068
Program Direction			
Program Direction - EM	92.358	83.203	72.963
Nuclear Materials & Facilities Stabilization			
Nuclear Materials & Facilities Stabilization	212.735	297.321	312.566
Policy and Management			
Policy and Management..	913	5.170	6.500
Environmental Management Science Program			
Environmental Management Science Program	200	200	0
Environmental Management Privatization			
Environmental Management Privatization....	0	0	185.000
TOTAL DEFENSE ENVIRONMENTAL RESTORATION & WASTE MANAGEMENT.	1,429.327	1,319.082	1,260.106
OTHER DEFENSE ACTIVITIES			
Verification and Control Technology			
Arms Control	4.355	15.230	17.260
Intelligence	5.389	5.339	5,040
Nonproliferation & Verification R&D	14.425	17.155	14.865
TOTAL Verification and Control Technology	24.169	37.724	37.165
Nuclear Safeguards and Security			
Security Affairs	4.030	2.022	2.122
Security Investigations			
Security Investigations	997	880	800
Worker and Community Transition			
Worker and Community Transition	145	90	0
Fissile Materials Control & Disposition			
Fissile Materials Control & Disposition	257	570	0
Emergency Management			
Emergency Management	200	200	200

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WASHINGTON	FY 1995 COMPARABLE	FY 1996 COMPARABLE	FY 1997 REQUEST
Environment, Safety, and Health Environment, Safety, and Health	10.036	8.918	9.262
International Nuclear Safety International Nuclear Safety	55.300	27.000	61.400
Nuclear Security Nuclear Security	0	0	5.000
TOTAL OTHER DEFENSE ACTIVITIES	95.134	77.404	115.949
DEPARTMENTAL ADMINISTRATION			
Office of Policy Environmental Policy Studies	372	245	0
Cost of Work for Others Cost of Work for Others	32	532	0
Human Resources & Administration Program Direction - HR	88	10	10
TOTAL DEPARTMENTAL ADMINISTRATION	492	787	10
OFFICE OF THE INSPECTOR GENERAL			
Office of the Inspector General Office of Inspector General	1.085	993	963
TOTAL OFFICE OF THE INSPECTOR GENERAL	1.085	993	963
BONNEVILLE POWER ADMINISTRATION FUND			
Bonneville Power Administration Bonneville Power Administration	1,422.009	1,452.379	1,437.702
TOTAL BONNEVILLE POWER ADMINISTRATION FUND	1,422.009	1,452.379	1,437.702
WESTERN AREA POWER ADMIN. CONST. REHAB. OPER. & MAINT.			
Systems Operation and Maintenance WAPA - Operation and Maintenance	15.819	10.984	13.854
TOTAL WESTERN AREA POWER ADMIN. CONST. REHAB. OPER. & MAINT.	15.819	10.984	13.854
FOSSIL ENERGY RESEARCH AND DEVELOPMENT			
Coal Research and Development Advanced Research and Tech. Development	1.100	985	740
Oil, Gas, and Shale Research and Development Fuel Cells	398	350	290
Environmental Restoration Environmental Restoration - FE	2.226	1.274	1.077
TOTAL FOSSIL ENERGY RESEARCH AND DEVELOPMENT	3.724	2.609	2.107
ENERGY CONSERVATION			
Building Technologies, State, & Community Sector Research & Development	11.092	6.382	11.730
Grants	4.999	2.714	3.784
TOTAL Building Technologies, State, & Community Sector	16.091	9.096	15.514
Industrial Technologies Industry Sector	4.952	855	730

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WASHINGTON	FY 1995 COMPARABLE	FY 1996 COMPARABLE	FY 1997 REQUEST
Transportation Technologies			
Transportation Sector	1,696	1,925	3,332
Utility Technologies			
Utility Sector	340	0	0
Policy and Management			
Policy and Management - EE	123	1,445	1,130
- Federal Energy Management Program			
Federal Energy Management Program	2,967	2,720	2,850
TOTAL ENERGY CONSERVATION	26,169	16,041	23,556
NUCLEAR WASTE FUND			
Nuclear Waste Disposal Fund			
Nuclear Waste Fund	323	65	100
Program Direction - RW	84	85	87
TOTAL Nuclear Waste Disposal Fund	407	150	187
TOTAL NUCLEAR WASTE FUND	407	150	187
ENERGY INFORMATION ADMINISTRATION			
Energy Information Administration			
National Energy Information System	203	173	147
TOTAL ENERGY INFORMATION ADMINISTRATION	203	173	147
TOTAL WASHINGTON	3,262,331	3,114,677	3,073,382

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WEST VIRGINIA

	FY 1995 COMPARABLE	FY 1996 COMPARABLE	FY 1997 REQUEST
ENERGY SUPPLY RESEARCH AND DEVELOPMENT ACTIVITIES			
Solar and Renewable Energy			
Biofuels.....	0	1,000	1,500
Biological and Environmental Research			
Biological and Environmental Research.....	99	69	0
TOTAL ENERGY SUPPLY RESEARCH AND DEVELOPMENT ACTIVITIES.....	99	1,069	1,500
DEFENSE ENVIRONMENTAL RESTORATION & WASTE MANAGEMENT			
Science and Technology			
Science and Technology.....	49,024	76,368	73,742
Program Direction			
Program Direction - EM.....	3,772	2,458	2,332
TOTAL DEFENSE ENVIRONMENTAL RESTORATION & WASTE MANAGEMENT.....	52,796	78,826	76,074
FOSSIL ENERGY RESEARCH AND DEVELOPMENT			
Coal Research and Development			
Advanced Research and Tech. Development.....	3,465	1,973	2,712
Advanced Clean Fuels Research.....	477	0	200
Advanced Clean/Efficient Power Systems.....	19,244	16,549	16,003
TOTAL Coal Research and Development.....	23,186	18,522	18,915
Oil, Gas, and Shale Research and Development			
Natural Gas Research.....	4,848	3,826	4,140
Fuel Cells.....	657	882	31,916
Oil Technology.....	250	250	0
TOTAL Oil, Gas, and Shale Research and Development.....	5,755	4,958	36,056
Program Direction and Management Support			
Energy Technology Center Program Direction.....	28,102	27,002	19,263
Plant & Capital Equipment			
Plant - FE.....	2,440	0	0
Capital Equipment - FE.....	222	0	0
TOTAL Plant & Capital Equipment.....	2,662	0	0
TOTAL FOSSIL ENERGY RESEARCH AND DEVELOPMENT.....	59,705	50,482	74,234
ENERGY CONSERVATION			
Building Technologies, State, & Community Sector			
Grants.....	3,326	1,860	2,630
TOTAL ENERGY CONSERVATION.....	3,326	1,860	2,630
TOTAL WEST VIRGINIA.....	115,926	132,237	154,438

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WISCONSIN	FY 1995 COMPARABLE	FY 1996 COMPARABLE	FY 1997 REQUEST
ENERGY SUPPLY RESEARCH AND DEVELOPMENT ACTIVITIES			
Biological and Environmental Research			
Biological and Environmental Research.....	1.978	1.351	1.014
Magnetic Fusion			
Fusion Energy Research.....	6.846	4.765	5.245
Supporting Research and Technical Analysis			
Basic Energy Sciences.....	2.290	2.087	2.260
Computational & Technology Research.....	325	325	0
TOTAL Supporting Research and Technical Analysis.....	2.615	2.412	2.260
TOTAL ENERGY SUPPLY RESEARCH AND DEVELOPMENT ACTIVITIES.....	11.439	8.528	8.519
GENERAL SCIENCE AND RESEARCH ACTIVITIES			
High Energy Physics			
High Energy Physics.....	6.084	9.686	6.563
Nuclear Physics			
Nuclear Physics.....	140	144	144
TOTAL GENERAL SCIENCE AND RESEARCH ACTIVITIES.....	6.224	9.830	6.707
ENERGY CONSERVATION			
Building Technologies, State, & Community Sector			
Grants.....	8.714	4.821	6.726
TOTAL ENERGY CONSERVATION.....	8.714	4.821	6.726
TOTAL WISCONSIN.....	26.377	23.179	21.952

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FY 1997 CONGRESSIONAL BUDGET
STATE TABLE
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WYOMING	FY 1995 COMPARABLE	FY 1996 COMPARABLE	FY 1997 REQUEST
ENERGY SUPPLY RESEARCH AND DEVELOPMENT ACTIVITIES			
Environmental Restoration and Waste Management			
Environmental Restoration.....	1.245	1.754	722
Supporting Research and Technical Analysis			
Basic Energy Sciences.....	93	93	93
TOTAL ENERGY SUPPLY RESEARCH AND DEVELOPMENT ACTIVITIES.....	1.338	1.847	815
GENERAL SCIENCE AND RESEARCH ACTIVITIES			
Nuclear Physics			
Nuclear Physics.....	27	15	0
TOTAL GENERAL SCIENCE AND RESEARCH ACTIVITIES.....	27	15	0
DEPARTMENTAL ADMINISTRATION			
Human Resources & Administration			
Program Direction - HR.....	9	9	9
TOTAL DEPARTMENTAL ADMINISTRATION.....	9	9	9
BONNEVILLE POWER ADMINISTRATION FUND			
Bonneville Power Administration			
Bonneville Power Administration.....	7.900	6.600	6.600
TOTAL BONNEVILLE POWER ADMINISTRATION FUND.....	7.900	6.600	6.600
WESTERN AREA POWER ADMIN. CONST., REHAB., OPER. & MAINT.			
Systems Operation and Maintenance			
WAPA - Operation and Maintenance.....	10.574	8.744	7.457
Program Direction - WP			
Program Direction - WP.....	3.416	3.486	3.271
TOTAL WESTERN AREA POWER ADMIN. CONST., REHAB., OPER. & MAINT.....	13.990	12.230	10.728
COLORADO RIVER BASINS POWER MARKETING FUND (WAPA)			
Colorado River Storage Project			
Colorado River Basins Fund.....	1.548	1.745	897
TOTAL COLORADO RIVER BASINS POWER MARKETING FUND (WAPA).....	1.548	1.745	897
FOSSIL ENERGY RESEARCH AND DEVELOPMENT			
Environmental Restoration			
Environmental Restoration - FE.....	2.181	4.232	3.500
Cooperative R&D Ventures			
Cooperative R&D.....	3.779	3.000	1.980
TOTAL FOSSIL ENERGY RESEARCH AND DEVELOPMENT.....	5.960	7.232	5.480
NAVAL PETROLEUM AND OIL SHALE RESERVES			
Naval Petroleum and Oil Shale Reserves			
Naval Petroleum and Oil Shale Reserves.....	16.226	16.800	10.845
TOTAL NAVAL PETROLEUM AND OIL SHALE RESERVES.....	16.226	16.800	10.845
ENERGY CONSERVATION			
Building Technologies, State, & Community Sector			
Grants.....	1.377	739	1,070
TOTAL ENERGY CONSERVATION.....	1.377	739	1,070
TOTAL WYOMING.....	48,375	47,217	36,444

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ALL OTHER (FOREIGN)	FY 1995 COMPARABLE	FY 1996 COMPARABLE	FY 1997 REQUEST
ENERGY SUPPLY RESEARCH AND DEVELOPMENT ACTIVITIES			
Biological and Environmental Research			
Biological and Environmental Research.....	1,525	1,275	550
Magnetic Fusion			
Fusion Energy Research.....	200	0	0
TOTAL ENERGY SUPPLY RESEARCH AND DEVELOPMENT ACTIVITIES.....	1,725	1,275	550
FOSSIL ENERGY RESEARCH AND DEVELOPMENT			
Coal Research and Development			
Advanced Research and Tech. Development	903	899	900
Advanced Clean/Efficient Power Systems.....	0	180	180
TOTAL Coal Research and Development.....	903	1,079	1,080
Oil, Gas, and Shale Research and Development			
Oil Technology.....	85	85	35
TOTAL FOSSIL ENERGY RESEARCH AND DEVELOPMENT.....	988	1,164	1,115
TOTAL ALL OTHER (FOREIGN).....	2,713	2,439	1,665

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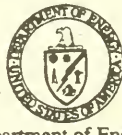
DEPARTMENT OF ENERGY
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	FY 1995 COMPARABLE	FY 1996 COMPARABLE	FY 1997 REQUEST
TOTAL DEPARTMENT OF ENERGY.....	22,154,817	21,606,579	20,914,688
	=====	=====	=====

FY 1997 Congressional Budget Request

Laboratory Table

Hazel R. O'Leary
Secretary of Energy



Chief Financial
Officer

March 1996

Department of Energy

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FY 1997 CONGRESSIONAL BUDGET
LABORATORY/FACILITY TABLE
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PAGE NUMBER	LABORATORY/FACILITY SUMMARY	FY 1995 COMPARABLE	FY 1996 COMPARABLE	FY 1997 REQUEST
1	ALASKA POWER ADMINISTRATION	6.492	4,260	4,000
2	ALBUQUERQUE OPERATIONS OFFICE	465,176	459,679	426,681
4	AMES LABORATORY	29,533	25,635	24,426
5	ARGONNE NATIONAL LAB(EAST)	346,946	309,473	291,710
8	ARGONNE NATIONAL LAB(WEST)	105,798	80,209	81,791
9	BARTLESVILLE PROJECT OFFICE	66,900	52,603	55,690
10	BATES LINEAR ACCELERATOR LABORATORY	16,436	16,713	18,418
11	BETTIS ATOMIC POWER LABORATORY	341,100	338,180	333,200
12	BONNEVILLE POWER ADMINISTRATION	3,079,454	3,324,153	3,360,175
13	BROOKHAVEN NATIONAL LABORATORY	344,332	344,806	351,865
15	CHICAGO OPERATIONS OFFICE	742,702	547,937	584,572
17	CONTINUOUS ELECTRON BEAM ACCELERATOR FACILITY	70,576	67,850	69,541
18	ENERGY TECHNOLOGY ENGINEERING CENTER	17,905	11,119	23,449
19	ENVIRONMENTAL MEASUREMENTS LABORATORY	250	0	0
20	FERMI NATIONAL ACCELERATOR LABORATORY	256,163	260,093	264,295
21	FERNALD ENVIRONMENTAL MANAGEMENT PROJECT	233,005	260,567	266,958
22	GOLDEN FIELD OFFICE	48,771	44,707	85,571
23	GRAND JUNCTION PROJECT OFFICE	33,944	46,340	50,159
24	HANFORD SITE	336,624	394,778	392,548
25	IDAHO CHEMICAL PROCESSING PLANT	61,487	59,622	44,472
26	IDAHO NATIONAL ENGINEERING LABORATORY	508,673	483,571	455,966
28	IDAHO OPERATIONS OFFICE	116,761	122,049	149,238
30	INHALATION TOXICOLOGY RESEARCH INSTITUTE	9,202	7,530	4,544
31	K-25 SITE	203,497	190,468	139,865
32	KANSAS CITY PLANT	296,822	328,513	290,480
33	KNOLLS ATOMIC POWER LABORATORY	288,285	271,868	261,700
34	LABORATORY OF RADIOBIOLOGY AND ENVIRONMENTAL HEALTH	2,782	1,443	681
35	LAWRENCE BERKELEY LABORATORY	235,053	224,933	241,924
37	LAWRENCE LIVERMORE NATIONAL LABORATORY	674,769	694,302	623,532
40	LOS ALAMOS NATIONAL LABORATORY	864,774	922,507	944,082
43	MORGANTOWN ENERGY TECHNOLOGY CENTER	244,806	240,804	215,701
44	MOUND PLANT	106,742	109,260	95,593
45	MULTIPLE FIELD INSPECTION SITES	8,673	8,687	9,263
46	NATIONAL RENEWABLE ENERGY LABORATORY	227,637	171,778	224,146
48	NAVAL OIL SHALE RESERVE NO 1	113	0	120
49	NAVAL OIL SHALE RESERVE NO 2	32	0	35
50	NAVAL OIL SHALE RESERVE NO 3	2,151	0	1,245
51	NAVAL PETROLEUM RESERVE NO 1	166,537	129,686	136,200
52	NAVAL PETROLEUM RESERVE NO 3	14,075	16,800	9,600
53	NAVAL RESEARCH LABORATORY	8,950	8,500	8,156
54	NEVADA OPERATIONS OFFICE	477,292	410,083	411,340
56	NEVADA TEST SITE	31,675	29,417	33,131
57	NEW BRUNSWICK LABORATORY	4,463	4,980	4,967
58	OAK RIDGE INSTITUTE FOR SCIENCE & EDUCATION	30,702	21,325	21,970
60	OAK RIDGE NATIONAL LABORATORY	575,379	477,900	493,354
63	OAK RIDGE OPERATIONS OFFICE	371,522	325,778	327,878
66	OAK RIDGE RESERVATION	11,862	11,685	15,735
67	OAKLAND OPERATIONS OFFICE	332,926	303,449	269,921
69	OFFICE OF SCIENTIFIC & TECHNICAL INFORMATION	16,803	12,235	12,249
70	OHIO FIELD OFFICE	198,683	180,634	205,334
71	PACIFIC NORTHWEST LABORATORY	271,857	244,992	264,330
74	PADUCAH GASEOUS DIFFUSION PLANT	76,092	69,189	50,137
75	PANTEX PLANT	287,794	306,071	285,806
76	PINELLAS PLANT	48,369	59,170	77,332
77	PITTSBURGH ENERGY TECHNOLOGY CENTER	104,441	126,645	75,848
78	PITTSBURGH NAVAL REACTORS	8,599	5,625	6,700
79	PORTSMOUTH GASEOUS DIFFUSION PLANT	96,594	79,318	78,347
80	PRINCETON PLASMA PHYSICS LABORATORY	130,278	65,035	76,011
81	RICHLAND OPERATIONS OFFICE	1,209,766	1,006,728	958,425
83	RICHLAND PRODUCTION FACILITIES	200	0	0
84	ROCKY FLATS OFFICE	79,366	52,233	50,443
85	ROCKY FLATS ENVIRONMENTAL TECHNOLOGY SITE	602,887	584,217	550,104
86	SANDIA NATIONAL LABORATORIES	956,348	931,634	868,921

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PAGE NUMBER	LABORATORY/FACILITY SUMMARY	FY 1995 COMPARABLE	FY 1996 COMPARABLE	FY 1997 REQUEST
89	SAVANNAH RIVER ECOLOGY LABORATORY.....	149	100	100
90	SAVANNAH RIVER OPERATIONS OFFICE.....	884.165	716.809	630.654
91	SAVANNAH RIVER SITE.....	848.281	752.320	662.811
92	SAVANNAH RIVER TECHNOLOGY CENTER.....	3.632	4.170	2.581
93	SCHENECTADY NAVAL REACTORS.....	5.324	5.412	5.200
94	SOUTHEASTERN POWER ADMINISTRATION.....	30.583	29.952	27.495
95	SOUTHWESTERN POWER ADMINISTRATION.....	30.848	31.048	28.104
96	SPECIFIC MANUFACTURING CAPABILITY FACILITY.....	1.255	281	281
97	STANFORD LINEAR ACCELERATOR CENTER.....	190.512	201.787	200.796
98	STRATEGIC PETROLEUM RESERVE - BAYOU CHOCTOW.....	10.412	12.078	17.952
99	STRATEGIC PETROLEUM RESERVE - BIG HILL.....	17.628	24.756	21.683
100	STRATEGIC PETROLEUM RESERVE - BRYAN MOUND.....	42.733	34.871	55.439
101	STRATEGIC PETROLEUM RESERVE - ST JAMES TERMINAL.....	7.657	6.604	6.212
102	STRATEGIC PETROLEUM RESERVE - WEEKS ISLAND.....	15.904	36.226	13.931
103	STRATEGIC PETROLEUM RESERVE - WEST HACKBERRY.....	53.103	24.661	22.587
104	STRATEGIC PETROLEUM RESERVE PROJECT OFFICE.....	92.267	143.776	79.527
105	SUPERCONDUCTING SUPER COLLIDER LABORATORY.....	180	0	0
106	WASHINGTON HEADQUARTERS.....	2,326.421	2,569.125	2,419.050
112	WASTE ISOLATION PILOT PLANT.....	169.804	177.700	165.951
113	WELDON SPRINGS REMEDIAL ACTION PROJECT.....	41.403	58.500	67.500
114	WESTERN AREA POWER ADMINISTRATION.....	432.550	412.332	374.654
115	Y-12 PLANT.....	442.180	474.385	432.305
	TOTAL DEPARTMENT OF ENERGY.....	22,154.817	21,606.579	20,914.688

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DEPARTMENT OF ENERGY
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LABORATORY/FACILITY TABLE
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ALASKA POWER ADMINISTRATION	FY 1995 COMPARABLE	FY 1996 COMPARABLE	FY 1997 REQUEST
ALASKA POWER ADMINISTRATION - OPERATION & MAINTENANCE			
Operation and Maintenance			
APA - Operation and Maintenance	3.404	-1.052	0
Program Direction - AK	3.088	3.208	4.000
TOTAL Operation and Maintenance	6.492	4.260	4.000
TOTAL ALASKA POWER ADMINISTRATION - OPERATION & MAINTENANCE	6.492	4.260	4.000
TOTAL ALASKA POWER ADMINISTRATION	6.492	4.260	4.000

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LABORATORY/FACILITY TABLE
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ALBUQUERQUE OPERATIONS OFFICE

	FY 1995 COMPARABLE	FY 1996 COMPARABLE	FY 1997 REQUEST
ENERGY SUPPLY RESEARCH AND DEVELOPMENT ACTIVITIES			
Solar and Renewable Energy			
Photovoltaic Systems R&D.....	970	750	1,000
Geothermal Energy R&D.....	1,400	1,275	1,275
Electric Energy Systems & Storage.....	0	0	10
Hydrogen Research R&D.....	0	150	150
TOTAL Solar and Renewable Energy.....	2,370	2,175	2,435
Nuclear Fission			
Advanced Radioisotope Power Systems.....	342	320	845
Isotope Support.....	125	0	0
TOTAL Nuclear Fission.....	467	320	845
Environmental Restoration and Waste Management			
Environmental Restoration.....	91,294	74,146	51,215
Biological and Environmental Research			
Biological and Environmental Research.....	1,626	2,034	2,310
Supporting Research and Technical Analysis			
Basic Energy Sciences.....	87	87	0
University & Science Education			
University & Science Education.....	3,630	0	0
TOTAL ENERGY SUPPLY RESEARCH AND DEVELOPMENT ACTIVITIES.....	99,474	78,762	56,805
WEAPONS ACTIVITIES			
Program Direction			
Program Direction - DP.....	175,457	171,250	169,961
Stockpile Management			
Stockpile Management.....	73,966	118,979	137,037
Stockpile Stewardship			
Stockpile Stewardship.....	841	530	0
TOTAL WEAPONS ACTIVITIES.....	250,264	290,759	306,998
DEFENSE ENVIRONMENTAL RESTORATION & WASTE MANAGEMENT			
Environmental Restoration			
Environmental Restoration.....	3,328	3,283	2,514
Waste Management			
Waste Management.....	19,775	4,220	0
Science and Technology			
Science and Technology.....	827	632	4,410
Site Operations			
Site Operations.....	3,471	2,000	4,164
Program Direction			
Program Direction - EM.....	24,580	25,757	25,830
Nuclear Materials & Facilities Stabilization			
Nuclear Materials & Facilities Stabilization.....	0	55	0
Policy and Management			
Policy and Management.....	400	1,790	2,200
Environmental Management Science Program			
Environmental Management Science Program.....	0	150	0
TOTAL DEFENSE ENVIRONMENTAL RESTORATION & WASTE MANAGEMENT.....	52,381	37,887	39,118
OTHER DEFENSE ACTIVITIES			
Nuclear Safeguards and Security			
Security Affairs.....	8,930	8,799	8,463
Security Investigations			
Security Investigations.....	8,000	6,977	5,275

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ALBUQUERQUE OPERATIONS OFFICE	FY 1995 COMPARABLE	FY 1996 COMPARABLE	FY 1997 REQUEST
Worker and Community Transition			
Worker and Community Transition	31.871	21.649	0
Fissile Materials Control & Disposition			
Fissile Materials Control & Disposition	9.000	10.020	5.000
Emergency Management			
Emergency Management	100	0	0
TOTAL OTHER DEFENSE ACTIVITIES	57.901	47.445	18.738
DEPARTMENTAL ADMINISTRATION			
Cost of Work for Others			
Cost of Work for Others	1.700	2.000	2.000
Human Resources & Administration			
Program Direction - HR	100	100	100
Economic Impact & Diversity			
Minority Economic Impact	0	40	40
TOTAL DEPARTMENTAL ADMINISTRATION	1.800	2.140	2.140
OFFICE OF THE INSPECTOR GENERAL			
Office of the Inspector General			
Office of Inspector General	3.186	2.516	2.712
TOTAL OFFICE OF THE INSPECTOR GENERAL	3.186	2.516	2.712
ENERGY CONSERVATION			
Industrial Technologies			
Industry Sector	170	170	170
TOTAL ENERGY CONSERVATION	170	170	170
TOTAL ALBUQUERQUE OPERATIONS OFFICE	465.176	459.679	426.681

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AMES LABORATORY

FY 1995
COMPARABLE FY 1996
COMPARABLE FY 1997
REQUEST.

ENERGY SUPPLY RESEARCH AND DEVELOPMENT ACTIVITIES

Nuclear Fission			
Advanced Radioisotope Power Systems	375	365	300
Environmental Restoration and Waste Management			
Waste Management	670	300	315
Biological and Environmental Research			
Biological and Environmental Research	657	596	581
Supporting Research and Technical Analysis			
Basic Energy Sciences	15,475	16,028	16,227
Computational & Technology Research	6,053	5,341	4,578
TOTAL Supporting Research and Technical Analysis	21,528	21,369	20,805

University & Science Education

University & Science Education	428	95	100
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TOTAL ENERGY SUPPLY RESEARCH AND DEVELOPMENT ACTIVITIES	23,658	22,725	22,101
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DEFENSE ENVIRONMENTAL RESTORATION & WASTE MANAGEMENT

Environmental Restoration	696	250	200
Environmental Restoration			
Science and Technology	4,610	2,510	1,975
Science and Technology			

TOTAL DEFENSE ENVIRONMENTAL RESTORATION & WASTE MANAGEMENT	5,306	2,760	2,175
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FOSSIL ENERGY RESEARCH AND DEVELOPMENT

Coal Research and Development			
Advanced Research and Tech. Development	294	0	0
Advanced Clean/Efficient Power Systems	50	0	0
TOTAL Coal Research and Development	344	0	0

TOTAL FOSSIL ENERGY RESEARCH AND DEVELOPMENT	344	0	0
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ENERGY CONSERVATION

Industrial Technologies			
Industry Sector	225	150	150
TOTAL ENERGY CONSERVATION	225	150	150

TOTAL AMES LABORATORY	29,533	25,635	24,426
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ARGONNE NATIONAL LAB(EAST)	FY 1995 COMPARABLE	FY 1996 COMPARABLE	FY 1997 REQUEST
ENERGY SUPPLY RESEARCH AND DEVELOPMENT ACTIVITIES			
Solar and Renewable Energy			
Solar Thermal R&D	4	0	0
Biofuels	141	0	0
Electric Energy Systems & Storage	4,225	3,350	3,800
TOTAL Solar and Renewable Energy	4,370	3,350	3,800
Nuclear Fission			
Light Water Reactors	1,260	1,377	500
Advanced Reactor R&D	8,700	0	0
Space Reactor Power Systems	25	0	0
Nuclear Technology Research & Development	0	25,000	30,000
Program Direction - NE	262	0	0
Termination Costs	2,600	2,600	1,800
TOTAL Nuclear Fission	12,847	28,977	32,300
Environment, Safety and Health			
Environment, Safety and Health	3,463	3,024	2,687
Environmental Restoration and Waste Management			
Environmental Restoration	12,470	6,768	8,176
Waste Management	16,107	7,583	10,692
TOTAL Environmental Restoration and Waste Management	28,577	14,351	18,868
Biological and Environmental Research			
Biological and Environmental Research	19,318	15,011	8,318
Magnetic Fusion			
Fusion Energy Research	7,743	5,025	4,070
Supporting Research and Technical Analysis			
Basic Energy Sciences	177,375	145,511	141,579
Advanced Neutron Source	-200	0	0
Energy Research Analyses	300	150	0
Computational & Technology Research	20,104	12,551	11,558
TOTAL Supporting Research and Technical Analysis	197,579	158,212	153,137
Multiprogram Facilities Support			
Multiprogram Energy Labs - Facilities Support	6,371	8,622	6,198
In-House Energy Management			
In-House Energy Management	1,295	0	0
University & Science Education			
University & Science Education	5,288	2,255	2,700
TOTAL ENERGY SUPPLY RESEARCH AND DEVELOPMENT ACTIVITIES	286,851	238,827	232,078
URANIUM SUPPLY AND ENRICHMENT ACTIVITIES			
Uranium Supply and Enrichment Activities			
Uranium Supply and Enrichment Activities	1,380	3,200	2,160
TOTAL URANIUM SUPPLY AND ENRICHMENT ACTIVITIES	1,380	3,200	2,160
GENERAL SCIENCE AND RESEARCH ACTIVITIES			
High Energy Physics			
High Energy Physics	8,918	8,580	8,410
Nuclear Physics			
Nuclear Physics	15,623	15,491	16,220
TOTAL GENERAL SCIENCE AND RESEARCH ACTIVITIES	24,541	24,071	24,630
WEAPONS ACTIVITIES			
Stockpile Management			
Stockpile Management	110	110	126

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ARGONNE NATIONAL LAB(EAST)	FY 1995 COMPARABLE	FY 1996 COMPARABLE	FY 1997 REQUEST
Stockpile Stewardship			
Stockpile Stewardship.....	1,380	1,200	0
TOTAL WEAPONS ACTIVITIES.....	1,490	1,310	126
DEFENSE ENVIRONMENTAL RESTORATION & WASTE MANAGEMENT			
Environmental Restoration			
Environmental Restoration.....	0	1,063	0
Nuclear Materials & Facilities Stabilization			
Nuclear Materials & Facilities Stabilization.....	0	56	0
TOTAL DEFENSE ENVIRONMENTAL RESTORATION & WASTE MANAGEMENT.....	0	1,119	0
OTHER DEFENSE ACTIVITIES			
Verification and Control Technology			
Arms Control.....	3,865	6,069	9,505
Intelligence.....	315	328	300
Nonproliferation & Verification R&D.....	2,699	2,188	1,950
TOTAL Verification and Control Technology.....	6,879	8,585	11,755
Nuclear Safeguards and Security			
Security Affairs.....	447	439	183
Environment, Safety, and Health			
Environment, Safety, and Health.....	1,467	1,430	1,467
International Nuclear Safety			
International Nuclear Safety.....	0	2,100	0
TOTAL OTHER DEFENSE ACTIVITIES.....	8,793	12,554	13,405
DEPARTMENTAL ADMINISTRATION			
Office of Policy			
Environmental Policy Studies.....	1,004	662	0
Cost of Work for Others			
Cost of Work for Others.....	50	265	1,295
Economic Impact & Diversity			
Minority Economic Impact.....	855	480	480
TOTAL DEPARTMENTAL ADMINISTRATION.....	1,909	1,407	1,775
OFFICE OF THE INSPECTOR GENERAL			
Office of the Inspector General			
Office of Inspector General.....	723	457	526
TOTAL OFFICE OF THE INSPECTOR GENERAL.....	723	457	526
FOSSIL ENERGY RESEARCH AND DEVELOPMENT			
Coal Research and Development			
Advanced Research and Techn. Development.....	1,143	1,390	1,145
Advanced Clean/Efficient Power Systems.....	600	250	250
TOTAL Coal Research and Development.....	1,743	1,640	1,395
Oil, Gas, and Shale Research and Development			
Natural Gas Research.....	513	950	500
Fuel Cells.....	836	1,094	920
Oil Technology.....	100	400	500
TOTAL Oil, Gas, and Shale Research and Development.....	1,449	2,444	1,920
Fuels Conversion (Natural Gas and Electricity)			
Fuels Conversion, Natural Gas and Electricity.....	600	387	300
TOTAL FOSSIL ENERGY RESEARCH AND DEVELOPMENT.....	3,792	4,471	3,615

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ARGONNE NATIONAL LAB(EAST)	FY 1995 COMPARABLE	FY 1996 COMPARABLE	FY 1997 REQUEST
ENERGY CONSERVATION			
Building Technologies, State. & Community Sector			
Research & Development.....	125	175	250
Industrial Technologies			
Industry Sector.....	7,864	14,530	4,267
Transportation Technologies			
Transportation Sector.....	6,127	6,795	8,275
Policy and Management			
Policy and Management - EE.....	396	102	102
Federal Energy Management Program			
Federal Energy Management Program.....	5	5	5
TOTAL ENERGY CONSERVATION.....	14,517	21,607	12,899
NUCLEAR WASTE FUND			
Nuclear Waste Disposal Fund			
Nuclear Waste Fund.....	2,950	450	496
TOTAL NUCLEAR WASTE FUND.....	2,950	450	496
TOTAL ARGONNE NATIONAL LAB(EAST).....	346,946	309,473	291,710

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ARGONNE NATIONAL LAB(WEST)	FY 1995 COMPARABLE	FY 1996 COMPARABLE	FY 1997 REQUEST
ENERGY SUPPLY RESEARCH AND DEVELOPMENT ACTIVITIES			
Nuclear Fission			
Facilities	6,970	0	0
Nuclear Technology Research & Development	20,559	0	0
Termination Costs	63,871	66,300	69,400
TOTAL Nuclear Fission	91,400	66,300	69,400
Environmental Restoration and Waste Management			
Environmental Restoration	503	941	1,718
Waste Management	3,410	2,854	5,270
TOTAL Environmental Restoration and Waste Management	3,913	3,795	6,988
TOTAL ENERGY SUPPLY RESEARCH AND DEVELOPMENT ACTIVITIES	95,313	70,095	76,388
DEFENSE ENVIRONMENTAL RESTORATION & WASTE MANAGEMENT			
Science and Technology			
Science and Technology	9,920	9,289	5,403
TOTAL DEFENSE ENVIRONMENTAL RESTORATION & WASTE MANAGEMENT	9,920	9,289	5,403
OTHER DEFENSE ACTIVITIES			
Fissile Materials Control & Disposition			
Fissile Materials Control & Disposition	565	825	0
TOTAL OTHER DEFENSE ACTIVITIES	565	825	0
TOTAL ARGONNE NATIONAL LAB(WEST)	105,798	80,209	81,791

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BARTLESVILLE PROJECT OFFICE	FY 1995 COMPARABLE	FY 1996 COMPARABLE	FY 1997 REQUEST
OTHER DEFENSE ACTIVITIES			
Worker and Community Transition			
Worker and Community Transition	150	0	0
TOTAL OTHER DEFENSE ACTIVITIES	150	0	0
FOSSIL ENERGY RESEARCH AND DEVELOPMENT			
Oil, Gas, and Shale Research and Development			
Natural Gas Research	1,577	1,281	3,575
Oil Technology	59,334	43,580	39,749
TOTAL Oil, Gas, and Shale Research and Development	60,911	44,861	43,324
Program Direction and Management Support			
Energy Technology Center Program Direction	3,391	3,017	8,500
Environmental Restoration			
Environmental Restoration - FE	1,666	4,025	3,166
Plant & Capital Equipment			
Capital Equipment - FE	32	0	0
TOTAL FOSSIL ENERGY RESEARCH AND DEVELOPMENT	66,000	51,903	54,990
STRATEGIC PETROLEUM RESERVE			
SPR - Facilities Development			
SPR - Facilities Development	750	700	700
TOTAL STRATEGIC PETROLEUM RESERVE	750	700	700
TOTAL BARTLESVILLE PROJECT OFFICE	66,900	52,603	55,690

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BATES LINEAR ACCELERATOR LABORATORY	FY 1995 COMPARABLE	FY 1996 COMPARABLE	FY 1997 REQUEST
GENERAL SCIENCE AND RESEARCH ACTIVITIES			
Nuclear Physics			
Nuclear Physics.....	16.436	16.713	18.418
TOTAL GENERAL SCIENCE AND RESEARCH ACTIVITIES.....	16.436	16.713	18.418
TOTAL BATES LINEAR ACCELERATOR LABORATORY.....	16.436	16.713	18.418

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BETTIS ATOMIC POWER LABORATORY	FY 1995 COMPARABLE	FY 1996 COMPARABLE	FY 1997 REQUEST
OTHER DEFENSE ACTIVITIES			
Naval Reactors			
Naval Reactors Development.....	341.100	338.180	333.200
TOTAL OTHER DEFENSE ACTIVITIES.....	341.100	338.180	333.200
TOTAL BETTIS ATOMIC POWER LABORATORY.....	341.100	338.180	333.200

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BONNEVILLE POWER ADMINISTRATION	FY 1995 COMPARABLE	FY 1996 COMPARABLE	FY 1997 REQUEST
OFFICE OF THE INSPECTOR GENERAL			
Office of the Inspector General			
Office of Inspector General.....	454	153	175
TOTAL OFFICE OF THE INSPECTOR GENERAL.....	454	153	175
BONNEVILLE POWER ADMINISTRATION FUND			
Bonneville Power Administration			
Bonneville Power Administration.....	3,079,000	3,324,000	3,360,000
TOTAL BONNEVILLE POWER ADMINISTRATION FUND.....	3,079,000	3,324,000	3,360,000
TOTAL BONNEVILLE POWER ADMINISTRATION.....	3,079,454	3,324,153	3,360,175

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BROOKHAVEN NATIONAL LABORATORY

	FY 1995 COMPARABLE	FY 1996 COMPARABLE	FY 1997 REQUEST
ENERGY SUPPLY RESEARCH AND DEVELOPMENT ACTIVITIES			
Solar and Renewable Energy			
Photovoltaic Systems R&D	380	300	400
Geothermal Energy R&D	1,722	1,380	1,400
Electric Energy Systems & Storage	551	350	400
TOTAL Solar and Renewable Energy	2,653	2,030	2,200
Nuclear Fission			
Advanced Reactor R&D	150	0	0
Isotope Support	428	1,100	1,600
TOTAL Nuclear Fission	578	1,100	1,600
Environment, Safety and Health			
Environment, Safety and Health	3,968	3,522	3,278
Environmental Restoration and Waste Management			
Environmental Restoration	13,200	20,011	20,000
Waste Management	11,202	5,016	5,850
TOTAL Environmental Restoration and Waste Management	24,402	25,027	25,850
Biological and Environmental Research			
Biological and Environmental Research	31,051	25,804	27,032
Magnetic Fusion			
Fusion Energy Research	83	97	97
Supporting Research and Technical Analysis			
Basic Energy Sciences	71,949	82,252	80,467
Energy Research Analyses	100	0	0
Computational & Technology Research	8,530	3,031	4,500
TOTAL Supporting Research and Technical Analysis	80,579	85,283	84,967
Multiprogram Facilities Support			
Multiprogram Energy Labs - Facilities Support	7,782	9,825	13,262
In-House Energy Management			
In-House Energy Management	1,934	0	0
University & Science Education			
University & Science Education	2,063	695	900
TOTAL ENERGY SUPPLY RESEARCH AND DEVELOPMENT ACTIVITIES	155,093	153,383	159,186
URANIUM SUPPLY AND ENRICHMENT ACTIVITIES			
Uranium Supply and Enrichment Activities	300	100	0
TOTAL URANIUM SUPPLY AND ENRICHMENT ACTIVITIES	300	100	0
GENERAL SCIENCE AND RESEARCH ACTIVITIES			
High Energy Physics			
High Energy Physics	76,347	73,712	70,782
Nuclear Physics			
Nuclear Physics	99,655	99,320	105,875
TOTAL GENERAL SCIENCE AND RESEARCH ACTIVITIES	176,002	173,032	176,657
WEAPONS ACTIVITIES			
Stockpile Management			
Stockpile Management	1,163	1,980	3,300
TOTAL WEAPONS ACTIVITIES	1,163	1,980	3,300

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BROOKHAVEN NATIONAL LABORATORY	FY 1995 COMPARABLE	FY 1996 COMPARABLE	FY 1997 REQUEST
DEFENSE ENVIRONMENTAL RESTORATION & WASTE MANAGEMENT			
Science and Technology			
Science and Technology.....	1,764	1,900	530
Nuclear Materials & Facilities Stabilization			
Nuclear Materials & Facilities Stabilization.....	0	124	0
TOTAL DEFENSE ENVIRONMENTAL RESTORATION & WASTE MANAGEMENT.....	1,764	2,024	530
OTHER DEFENSE ACTIVITIES			
Verification and Control Technology			
Arms Control.....	1,406	4,255	6,125
Nonproliferation & Verification R&D.....	4,578	4,775	2,600
TOTAL Verification and Control Technology.....	5,984	9,030	8,725
Nuclear Safeguards and Security			
Security Affairs.....	427	494	450
Fissile Materials Control & Disposition			
Fissile Materials Control & Disposition.....	320	0	0
Emergency Management			
Emergency Management.....	200	300	300
Environment, Safety, and Health			
Environment, Safety, and Health.....	41	100	100
TOTAL OTHER DEFENSE ACTIVITIES.....	6,972	9,924	9,575
DEPARTMENTAL ADMINISTRATION			
Office of Policy			
Environmental Policy Studies.....	50	33	0
Cost of Work for Others			
Cost of Work for Others.....	0	1,150	1,662
TOTAL DEPARTMENTAL ADMINISTRATION.....	50	1,183	1,662
FOSSIL ENERGY RESEARCH AND DEVELOPMENT			
Coal Research and Development			
Advanced Research and Tech. Development.....	0	50	0
Advanced Clean Fuels Research.....	100	0	0
Advanced Clean/Efficient Power Systems.....	158	150	0
TOTAL Coal Research and Development.....	258	200	0
Oil, Gas, and Shale Research and Development			
Oil Technology.....	825	925	400
TOTAL FOSSIL ENERGY RESEARCH AND DEVELOPMENT.....	1,083	1,125	400
ENERGY CONSERVATION			
Building Technologies, State, & Community Sector			
Research & Development.....	1,400	1,550	550
Transportation Technologies			
Transportation Sector.....	500	500	0
Federal Energy Management Program			
Federal Energy Management Program.....	5	5	5
TOTAL ENERGY CONSERVATION.....	1,905	2,055	555
TOTAL BROOKHAVEN NATIONAL LABORATORY.....	344,332	344,806	351,865

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CHICAGO OPERATIONS OFFICE

	FY 1995 COMPARABLE	FY 1996 COMPARABLE	FY 1997 REQUEST
ENERGY SUPPLY RESEARCH AND DEVELOPMENT ACTIVITIES			
Solar and Renewable Energy			
Photovoltaic Systems R&D	1,300	600	600
Biofuels	3,045	1,755	945
Wind Energy	0	355	500
Resource Assessment	14	0	0
Geothermal Energy R&D	0	15	0
Electric Energy Systems & Storage	0	0	100
Solar and Renewable Energy Deployment	0	8,440	0
TOTAL Solar and Renewable Energy	4,359	11,165	2,145
Nuclear Fission			
Light Water Reactors	30,267	14,175	18,000
Program Direction - NE	1,549	1,245	1,180
TOTAL Nuclear Fission	31,816	15,420	19,180
Environmental Restoration and Waste Management			
Environmental Restoration	590	1,266	2,961
Waste Management	18	1,500	500
Site Operations	110	1,676	793
TOTAL Environmental Restoration and Waste Management	718	4,442	4,254
Biological and Environmental Research			
Biological and Environmental Research	60,606	44,375	37,765
Magnetic Fusion			
Fusion Energy Research	52,854	41,003	42,635
Supporting Research and Technical Analysis			
Basic Energy Sciences	71,330	70,588	66,738
Energy Research Analyses	949	100	0
Computational & Technology Research	9,573	8,364	4,661
TOTAL Supporting Research and Technical Analysis	81,852	79,052	71,399
In-House Energy Management			
In-House Energy Management	200	0	0
Program Direction - ER			
Program Direction - ER	7,208	6,472	5,394
University & Science Education			
University & Science Education	14,857	1,305	0
Field Offices and Management			
Chicago Operations Office	28,170	26,574	27,277
TOTAL ENERGY SUPPLY RESEARCH AND DEVELOPMENT ACTIVITIES	282,640	229,808	210,049
GENERAL SCIENCE AND RESEARCH ACTIVITIES			
High Energy Physics			
High Energy Physics	71,168	74,760	69,570
Nuclear Physics			
Nuclear Physics	27,071	27,213	26,790
General Science Program Direction			
General Science Program Direction	1,905	1,826	1,880
TOTAL GENERAL SCIENCE AND RESEARCH ACTIVITIES	100,144	103,799	98,240
WEAPONS ACTIVITIES			
Program Direction			
Program Direction - DP	3,337	2,550	2,113
Stockpile Management			
Stockpile Management	19,647	30	30
TOTAL WEAPONS ACTIVITIES	22,984	2,580	2,143

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CHICAGO OPERATIONS OFFICE

	FY 1995 COMPARABLE	FY 1996 COMPARABLE	FY 1997- REQUEST
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DEFENSE ENVIRONMENTAL RESTORATION & WASTE MANAGEMENT

Environmental Restoration	2.224	170	903
Environmental Restoration			
Science and Technology	6.123	9.216	9.082
Science and Technology			
Site Operations	3.033	100	1.070
Site Operations			
Program Direction	12.927	9.201	8.550
Program Direction - EM			
Policy and Management	0	300	400
Policy and Management			

TOTAL DEFENSE ENVIRONMENTAL RESTORATION & WASTE MANAGEMENT	24.307	18.987	20.005
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OTHER DEFENSE ACTIVITIES

Security Investigations	300	0	200
Security Investigations			
Fissile Materials Control & Disposition	8.944	7.425	2.000
Fissile Materials Control & Disposition			
Emergency Management	15	0	0
Emergency Management			
Program Direction	1.532	1.550	1.398
Program Direction - NW			
International Nuclear Safety	3.838	0	4.300
International Nuclear Safety			

TOTAL OTHER DEFENSE ACTIVITIES	14.629	8.975	7.898
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DEPARTMENTAL ADMINISTRATION

Human Resources & Administration	145	92	92
Program Direction - HR			

TOTAL DEPARTMENTAL ADMINISTRATION	145	92	92
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ENERGY CONSERVATION

Building Technologies, State, & Community Sector	234.211	135.552	191.900
Grants			
Industrial Technologies	13.150	12.600	13.600
Industry Sector			
Transportation Technologies	45.341	34.920	40.020
Transportation Sector			
Utility Technologies	3.699	0	0
Utility Sector			
Federal Energy Management Program	922	474	475
Federal Energy Management Program			

TOTAL ENERGY CONSERVATION	297.323	183.546	245.995
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NUCLEAR WASTE FUND

Nuclear Waste Disposal Fund	231	50	50
Nuclear Waste Fund			

TOTAL NUCLEAR WASTE FUND	231	50	50
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ENERGY INFORMATION ADMINISTRATION

Energy Information Administration	299	100	100
National Energy Information System			

TOTAL ENERGY INFORMATION ADMINISTRATION	299	100	100
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TOTAL CHICAGO OPERATIONS OFFICE	742.702	547.937	584.572
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CONTINUOUS ELECTRON BEAM ACCELERATOR FACILITY	FY 1995 COMPARABLE	FY 1996 COMPARABLE	FY 1997 REQUEST
ENERGY SUPPLY RESEARCH AND DEVELOPMENT ACTIVITIES			
Magnetic Fusion			
Fusion Energy Research.....	0	5	0
Supporting Research and Technical Analysis			
Computational & Technology Research.....	669	150	180
University & Science Education			
University & Science Education.....	593	100	150
TOTAL ENERGY SUPPLY RESEARCH AND DEVELOPMENT ACTIVITIES	1,262	255	330
GENERAL SCIENCE AND RESEARCH ACTIVITIES			
High Energy Physics			
High Energy Physics.....	211	220	211
Nuclear Physics			
Nuclear Physics.....	69,103	67,375	69,000
TOTAL GENERAL SCIENCE AND RESEARCH ACTIVITIES	69,314	67,595	69,211
TOTAL CONTINUOUS ELECTRON BEAM ACCELERATOR FACILITY	70,576	67,850	69,541

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ENERGY TECHNOLOGY ENGINEERING CENTER	FY 1995 COMPARABLE	FY 1996 COMPARABLE	FY 1997 REQUEST
ENERGY SUPPLY RESEARCH AND DEVELOPMENT ACTIVITIES			
Solar and Renewable Energy			
Geothermal Energy R&D.....	8,100	0	0
Environmental Restoration and Waste Management			
Environmental Restoration.....	2,856	4,023	3,213
Waste Management.....	3,741	1,668	2,908
Site Operations.....	206	226	182
Nuclear Materials & Facilities Stabilization.....	0	1,672	16,146
TOTAL Environmental Restoration and Waste Management.....	6,803	7,589	22,449
In-House Energy Management			
In-House Energy Management.....	21	0	0
TOTAL ENERGY SUPPLY RESEARCH AND DEVELOPMENT ACTIVITIES.....	14,924	7,589	22,449
DEFENSE ENVIRONMENTAL RESTORATION & WASTE MANAGEMENT			
Environmental Restoration			
Environmental Restoration.....	700	3,500	1,000
Science and Technology			
Science and Technology.....	1,475	0	0
TOTAL DEFENSE ENVIRONMENTAL RESTORATION & WASTE MANAGEMENT.....	2,175	3,500	1,000
ENERGY CONSERVATION			
Transportation Technologies			
Transportation Sector.....	400	0	0
Federal Energy Management Program			
Federal Energy Management Program.....	406	30	0
TOTAL ENERGY CONSERVATION.....	806	30	0
TOTAL ENERGY TECHNOLOGY ENGINEERING CENTER.....	17,905	11,119	23,449

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ENVIRONMENTAL MEASUREMENTS LABORATORY	FY 1995 COMPARABLE	FY 1996 COMPARABLE	FY 1997 REQUEST
ENERGY SUPPLY RESEARCH AND DEVELOPMENT ACTIVITIES			
Biological and Environmental Research			
Biological and Environmental Research.....	250	0	0
TOTAL ENERGY SUPPLY RESEARCH AND DEVELOPMENT ACTIVITIES	250	0	0
TOTAL ENVIRONMENTAL MEASUREMENTS LABORATORY.....	250	0	0

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FERMI NATIONAL ACCELERATOR LABORATORY	FY 1995 COMPARABLE	FY 1996 COMPARABLE	FY 1997 REQUEST
ENERGY SUPPLY RESEARCH AND DEVELOPMENT ACTIVITIES			
Environmental Restoration and Waste Management			
Waste Management.....	5.020	1.950	2.102
Biological and Environmental Research			
Biological and Environmental Research.....	1.050	1.575	2.100
Supporting Research and Technical Analysis			
Computational & Technology Research.....	205	0	0
University & Science Education			
University & Science Education.....	1.257	355	350
TOTAL ENERGY SUPPLY RESEARCH AND DEVELOPMENT ACTIVITIES.....	7.532	3.880	4.552
GENERAL SCIENCE AND RESEARCH ACTIVITIES			
High Energy Physics			
High Energy Physics.....	248.631	256.213	259.743
TOTAL GENERAL SCIENCE AND RESEARCH ACTIVITIES.....	248.631	256.213	259.743
TOTAL FERMI NATIONAL ACCELERATOR LABORATORY.....	256.163	260.093	264.295

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FERNALD ENVIRONMENTAL MANAGEMENT PROJECT	FY 1995 COMPARABLE	FY 1996 COMPARABLE	FY 1997 REQUEST
ENERGY SUPPLY RESEARCH AND DEVELOPMENT ACTIVITIES			
University & Science Education			
University & Science Education.....	53	0	0
TOTAL ENERGY SUPPLY RESEARCH AND DEVELOPMENT ACTIVITIES.....	53	0	0
DEFENSE ENVIRONMENTAL RESTORATION & WASTE MANAGEMENT			
Environmental Restoration			
Environmental Restoration.....	229.550	257.281	261.800
Science and Technology			
Science and Technology.....	2.378	2.600	4.370
Site Operations			
Site Operations.....	120	0	0
TOTAL DEFENSE ENVIRONMENTAL RESTORATION & WASTE MANAGEMENT.....	232.048	259.881	266.170
OFFICE OF THE INSPECTOR GENERAL			
Office of the Inspector General			
Office of Inspector General.....	904	686	788
TOTAL OFFICE OF THE INSPECTOR GENERAL.....	904	686	788
TOTAL FERNALD ENVIRONMENTAL MANAGEMENT PROJECT.....	233.005	260.567	266.958

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GOLDEN FIELD OFFICE

	FY 1995 COMPARABLE	FY 1996 COMPARABLE	FY 1997 REQUEST
ENERGY SUPPLY RESEARCH AND DEVELOPMENT ACTIVITIES			
Solar and Renewable Energy			
Photovoltaic Systems R&D	17.800	8.150	18.000
Solar Thermal R&D	1.684	1.758	2.508
Biofuels	9.681	16.353	40.744
Wind Energy	3.000	0	0
Program Direction - EE	3.053	2.842	2.675
Geothermal Energy R&D	1.215	1.400	1.250
Electric Energy Systems & Storage	1.200	3.400	4.650
Hydrogen Research R&D	1.653	6.124	6.250
Renewable Energy Production Incentive Program	1.870	662	3.489
TOTAL Solar and Renewable Energy	41.156	40.689	79.566
Program Direction - ER			
Program Direction - ER	25	0	0
TOTAL ENERGY SUPPLY RESEARCH AND DEVELOPMENT ACTIVITIES	41.181	40.689	79.566
DEPARTMENTAL ADMINISTRATION			
Economic Impact & Diversity			
Minority Economic Impact	102	200	100
TOTAL DEPARTMENTAL ADMINISTRATION	102	200	100
ENERGY CONSERVATION			
Transportation Technologies			
Transportation Sector	1.510	0	0
Policy and Management			
Policy and Management - EE	2.222	3.018	4.905
Federal Energy Management Program			
Federal Energy Management Program	3.756	800	1.000
TOTAL ENERGY CONSERVATION	7.488	3.818	5.905
TOTAL GOLDEN FIELD OFFICE	48.771	44.707	85.571

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GRAND JUNCTION PROJECT OFFICE	FY 1995 COMPARABLE	FY 1996 COMPARABLE	FY 1997 REQUEST
ENERGY SUPPLY RESEARCH AND DEVELOPMENT ACTIVITIES			
Environmental Restoration and Waste Management			
Environmental Restoration.....	32.152	46.240	47.917
TOTAL ENERGY SUPPLY RESEARCH AND DEVELOPMENT ACTIVITIES.....	32.152	46.240	47.917
DEFENSE ENVIRONMENTAL RESTORATION & WASTE MANAGEMENT			
Waste Management			
Waste Management.....	0	0	2.242
Science and Technology			
Science and Technology.....	1.051	100	0
Site Operations			
Site Operations.....	741	0	0
TOTAL DEFENSE ENVIRONMENTAL RESTORATION & WASTE MANAGEMENT.....	1.792	100	2.242
TOTAL GRAND JUNCTION PROJECT OFFICE.....	33.944	46.340	50.159

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HANFORD SITE

	FY 1995 COMPARABLE	FY 1996 COMPARABLE	FY 1997 REQUEST
ENERGY SUPPLY RESEARCH AND DEVELOPMENT ACTIVITIES			
Nuclear Fission			
Advanced Radioisotope Power Systems.....	5.995	3.175	400
Isotope Support.....	400	400	750
TOTAL Nuclear Fission.....	6.395	3.575	1.150
Environmental Restoration and Waste Management			
Nuclear Materials & Facilities Stabilization.....	63.436	49.289	47.526
In-House Energy Management			
In-House Energy Management.....	575	0	0
TOTAL ENERGY SUPPLY RESEARCH AND DEVELOPMENT ACTIVITIES.....	70.406	52.864	48.676
DEFENSE ENVIRONMENTAL RESTORATION & WASTE MANAGEMENT			
Science and Technology			
Science and Technology.....	9.094	6.340	800
Site Operations			
Site Operations.....	42.170	39.459	30.102
Nuclear Materials & Facilities Stabilization			
Nuclear Materials & Facilities Stabilization.....	212.785	295.621	312.566
TOTAL DEFENSE ENVIRONMENTAL RESTORATION & WASTE MANAGEMENT.....	264.049	341.420	343.468
OTHER DEFENSE ACTIVITIES			
Nuclear Safeguards and Security			
Security Affairs.....	1.917	269	269
Fissile Materials Control & Disposition			
Fissile Materials Control & Disposition.....	117	100	0
Environment, Safety, and Health			
Environment, Safety, and Health.....	135	125	135
TOTAL OTHER DEFENSE ACTIVITIES.....	2.169	494	404
TOTAL HANFORD SITE.....	336.624	394.778	392.548

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IDAHO CHEMICAL PROCESSING PLANT	FY 1995 COMPARABLE	FY 1996 COMPARABLE	FY 1997 REQUEST
DEFENSE ENVIRONMENTAL RESTORATION & WASTE MANAGEMENT			
Waste Management			
Waste Management.....	60,400	58,595	43,445
TOTAL DEFENSE ENVIRONMENTAL RESTORATION & WASTE MANAGEMENT.....	60,400	58,595	43,445
OTHER DEFENSE ACTIVITIES			
Nuclear Safeguards and Security			
Security Affairs.....	827	827	827
Emergency Management			
Emergency Management.....	260	200	200
TOTAL OTHER DEFENSE ACTIVITIES.....	1,087	1,027	1,027
TOTAL IDAHO CHEMICAL PROCESSING PLANT.....	61,487	59,622	44,472

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IDAHO NATIONAL ENGINEERING LABORATORY

	FY 1995 COMPARABLE	FY 1996 COMPARABLE	FY 1997 REQUEST
ENERGY SUPPLY RESEARCH AND DEVELOPMENT ACTIVITIES			
Solar and Renewable Energy			
Geothermal Energy R&D.....	2.820	1.150	1.150
Nuclear Fission			
Light Water Reactors.....	590	123	500
Advanced Reactor R&D.....	60	0	0
Space Reactor Power Systems.....	125	0	0
Program Direction - NE.....	75	0	0
Civilian Radioactive Waste R&D.....	279	0	0
Termination Costs.....	1,170	75	0
Test Reactor Area Landlord.....	3,941	3,900	3,800
Advanced Test Reactor Fusion Irradiation.....	1,740	853	750
Isotope Support.....	1,960	600	2,000
University Reactor Fuel Assistance and Support.....	2,344	2,200	2,200
TOTAL Nuclear Fission.....	12,284	7,751	9,250
Environment, Safety and Health			
Environment, Safety and Health.....	6,258	5,876	5,469
Environmental Restoration and Waste Management			
Waste Management.....	5,610	0	4,958
Nuclear Materials & Facilities Stabilization.....	5,476	12,481	13,043
TOTAL Environmental Restoration and Waste Management.....	11,086	12,481	18,001
Biological and Environmental Research			
Biological and Environmental Research.....	3,340	2,326	2,445
Magnetic Fusion			
Fusion Energy Research.....	3,223	2,732	2,323
Supporting Research and Technical Analysis			
Basic Energy Sciences.....	3,660	3,024	3,138
Computational & Technology Research.....	510	95	0
TOTAL Supporting Research and Technical Analysis.....	4,170	3,119	3,138
In-House Energy Management			
In-House Energy Management.....	676	0	0
University & Science Education			
University & Science Education.....	313	120	150
TOTAL ENERGY SUPPLY RESEARCH AND DEVELOPMENT ACTIVITIES.....	44,232	35,555	41,926
GENERAL SCIENCE AND RESEARCH ACTIVITIES			
Nuclear Physics			
Nuclear Physics.....	0	0	100
TOTAL GENERAL SCIENCE AND RESEARCH ACTIVITIES.....	0	0	100
DEFENSE ENVIRONMENTAL RESTORATION & WASTE MANAGEMENT			
Environmental Restoration			
Environmental Restoration.....	105,009	93,965	109,259
Waste Management			
Waste Management.....	87,850	105,219	67,337
Science and Technology			
Science and Technology.....	29,237	21,663	13,615
Site Operations			
Site Operations.....	44,888	38,364	33,524
Nuclear Materials & Facilities Stabilization			
Nuclear Materials & Facilities Stabilization.....	136,887	131,568	137,555
TOTAL DEFENSE ENVIRONMENTAL RESTORATION & WASTE MANAGEMENT.....	403,871	390,779	361,290

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IDAHO NATIONAL ENGINEERING LABORATORY	FY 1995 COMPARABLE	FY 1996 COMPARABLE	FY 1997 REQUEST
OTHER DEFENSE ACTIVITIES			
Verification and Control Technology			
Arms Control	101	0	0
Intelligence	1,173	1,100	1,035
TOTAL Verification and Control Technology	1,274	1,100	1,035
Naval Reactors			
Naval Reactors Development	45,400	51,000	48,800
Fissile Materials Control & Disposition			
Fissile Materials Control & Disposition	170	100	0
Environment, Safety, and Health			
Environment, Safety, and Health	423	160	160
TOTAL OTHER DEFENSE ACTIVITIES	47,267	52,360	49,995
FOSSIL ENERGY RESEARCH AND DEVELOPMENT			
Coal Research and Development			
Advanced Research and Tech. Development	1,040	627	325
Oil, Gas, and Shale Research and Development			
Natural Gas Research	290	350	300
Oil Technology	327	350	250
TOTAL Oil, Gas, and Shale Research and Development	617	700	550
TOTAL FOSSIL ENERGY RESEARCH AND DEVELOPMENT	1,657	1,327	875
ENERGY CONSERVATION			
Industrial Technologies			
Industry Sector	4,890	1,270	0
Transportation Technologies			
Transportation Sector	3,860	2,275	1,775
Federal Energy Management Program			
Federal Energy Management Program	5	5	5
TOTAL ENERGY CONSERVATION	8,755	3,550	1,780
NUCLEAR WASTE FUND			
Nuclear Waste Disposal Fund			
Nuclear Waste Fund	2,891	0	0
TOTAL NUCLEAR WASTE FUND	2,891	0	0
TOTAL IDAHO NATIONAL ENGINEERING LABORATORY	508,673	483,571	455,966

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IDAHO OPERATIONS OFFICE

	FY 1995 COMPARABLE	FY 1996 COMPARABLE	FY 1997. REQUEST
ENERGY SUPPLY RESEARCH AND DEVELOPMENT ACTIVITIES			
Solar and Renewable Energy			
Program Direction - EE	141	148	155
Geothermal Energy R&D	12,538	14,390	16,425
TOTAL Solar and Renewable Energy	12,679	14,538	16,580
Nuclear Fission			
Program Direction - NE	108	105	110
Termination Costs	50	0	0
TOTAL Nuclear Fission	158	105	110
Environmental Restoration and Waste Management			
Waste Management	0	2,865	0
Site Operations	0	712	0
TOTAL Environmental Restoration and Waste Management	0	3,577	0
Biological and Environmental Research			
Biological and Environmental Research	65	0	0
University & Science Education			
University & Science Education	5,214	2,170	2,000
Field Offices and Management			
Idaho Operations Office	23,214	20,006	21,911
TOTAL ENERGY SUPPLY RESEARCH AND DEVELOPMENT ACTIVITIES	41,330	40,396	40,601
URANIUM SUPPLY AND ENRICHMENT ACTIVITIES			
Uranium Supply and Enrichment Activities			
Program Direction - NE	29	0	0
TOTAL URANIUM SUPPLY AND ENRICHMENT ACTIVITIES	29	0	0
WEAPONS ACTIVITIES			
Program Direction			
Program Direction - DP	2,774	1,575	1,690
Stockpile Management			
Stockpile Management	9,034	12,538	11,420
Stockpile Stewardship			
Stockpile Stewardship	267	456	0
TOTAL WEAPONS ACTIVITIES	12,075	14,569	13,110
DEFENSE ENVIRONMENTAL RESTORATION & WASTE MANAGEMENT			
Waste Management			
Waste Management	7,262	0	0
Science and Technology			
Science and Technology	8,570	21,020	51,742
Site Operations			
Site Operations	0	30	30
Program Direction			
Program Direction - EM	30,961	28,992	27,409
Nuclear Materials & Facilities Stabilization			
Nuclear Materials & Facilities Stabilization	2,213	-1,712	0
Policy and Management			
Policy and Management	0	-1,000	1,300
TOTAL DEFENSE ENVIRONMENTAL RESTORATION & WASTE MANAGEMENT	49,006	49,330	80,481
OTHER DEFENSE ACTIVITIES			
Verification and Control Technology			
Arms Control	80	0	0
Intelligence	105	225	210

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IDAHO OPERATIONS OFFICE

	FY 1995 COMPARABLE	FY 1996 COMPARABLE	FY 1997 REQUEST
Nonproliferation & Verification R&D.....	3,986	4,962	2,700
TOTAL Verification and Control Technology.....	4,171	5,187	2,910
Security Investigations			
Security Investigations.....	896	630	400
Naval Reactors			
Naval Reactors Development.....	870	870	900
Worker and Community Transition			
Worker and Community Transition.....	325	5,000	0
Fissile Materials Control & Disposition			
Fissile Materials Control & Disposition.....	0	25	0
TOTAL OTHER DEFENSE ACTIVITIES.....	6,262	11,712	4,210
DEPARTMENTAL ADMINISTRATION			
Human Resources & Administration			
Program Direction - HR.....	750	575	575
TOTAL DEPARTMENTAL ADMINISTRATION.....	750	575	575
OFFICE OF THE INSPECTOR GENERAL			
Office of the Inspector General			
Office of Inspector General.....	816	686	788
TOTAL OFFICE OF THE INSPECTOR GENERAL.....	816	686	788
ENERGY CONSERVATION			
Industrial Technologies			
Industry Sector.....	5,300	4,453	9,473
Transportation Technologies			
Transportation Sector.....	874	0	0
TOTAL ENERGY CONSERVATION.....	6,174	4,453	9,473
NUCLEAR WASTE FUND			
Nuclear Waste Disposal Fund			
Nuclear Waste Fund.....	60	60	0
Program Direction - RW.....	259	268	0
TOTAL Nuclear Waste Disposal Fund.....	319	328	0
TOTAL NUCLEAR WASTE FUND.....	319	328	0
TOTAL IDAHO OPERATIONS OFFICE.....	116,761	122,049	149,238

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INHALATION TOXICOLOGY RESEARCH INSTITUTE

	FY 1995 COMPARABLE	FY 1996 COMPARABLE	FY 1997 REQUEST
ENERGY SUPPLY RESEARCH AND DEVELOPMENT ACTIVITIES			
Environmental Restoration and Waste Management			
Environmental Restoration.....	1,702	1,360	325
Waste Management.....	654	604	596
Site Operations.....	21	26	40
TOTAL Environmental Restoration and Waste Management.....	2,377	1,990	961
Biological and Environmental Research			
Biological and Environmental Research.....	6,735	5,520	3,583
University & Science Education			
University & Science Education.....	90	20	0
TOTAL ENERGY SUPPLY RESEARCH AND DEVELOPMENT ACTIVITIES.....	9,202	7,530	4,544
TOTAL INHALATION TOXICOLOGY RESEARCH INSTITUTE.....	9,202	7,530	4,544

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K-25 SITE	FY 1995 COMPARABLE	FY 1996 COMPARABLE	FY 1997 REQUEST
ENERGY SUPPLY RESEARCH AND DEVELOPMENT ACTIVITIES			
In-House Energy Management			
In-House Energy Management.....	7.403	0	0
TOTAL ENERGY SUPPLY RESEARCH AND DEVELOPMENT ACTIVITIES.....	7.403	0	0
URANIUM SUPPLY AND ENRICHMENT ACTIVITIES			
Uranium Supply and Enrichment Activities			
Uranium Supply and Enrichment Activities.....	15.528	29.442	19.727
TOTAL URANIUM SUPPLY AND ENRICHMENT ACTIVITIES.....	15.528	29.442	19.727
URANIUM ENRICHMENT DECON. & DECOM. FUND			
Uranium Enrichment D & D Fund			
UE Decontamination & Decommissioning Fund.....	101.936	90.068	66.908
TOTAL URANIUM ENRICHMENT DECON. & DECOM. FUND.....	101.936	90.068	66.908
DEFENSE ENVIRONMENTAL RESTORATION & WASTE MANAGEMENT			
Environmental Restoration			
Environmental Restoration.....	15.726	14.088	4.243
Waste Management			
Waste Management.....	60.631	54.096	46.530
Nuclear Materials & Facilities Stabilization			
Nuclear Materials & Facilities Stabilization.....	0.	551	357
TOTAL DEFENSE ENVIRONMENTAL RESTORATION & WASTE MANAGEMENT.....	76.357	68.735	51.130
OTHER DEFENSE ACTIVITIES			
Verification and Control Technology			
Intelligence.....	2.273	2.223	2.100
TOTAL OTHER DEFENSE ACTIVITIES.....	2.273	2.223	2.100
TOTAL K-25 SITE.....	203.497	190.468	139.865

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KANSAS CITY PLANT

	FY 1995 COMPARABLE	FY 1996 COMPARABLE	FY 1997 REQUEST
ENERGY SUPPLY RESEARCH AND DEVELOPMENT ACTIVITIES			
In-House Energy Management			
In-House Energy Management	123	0	0
TOTAL ENERGY SUPPLY RESEARCH AND DEVELOPMENT ACTIVITIES	123	0	0
WEAPONS ACTIVITIES			
Program Direction			
Program Direction - DP	1,100	0	0
Stockpile Management			
Stockpile Management	282,537	311,134	274,700
Stockpile Stewardship			
Stockpile Stewardship	6,406	3,336	2,400
TOTAL WEAPONS ACTIVITIES	290,043	314,470	277,100
DEFENSE ENVIRONMENTAL RESTORATION & WASTE MANAGEMENT			
Environmental Restoration			
Environmental Restoration	1,498	8,529	5,256
Waste Management			
Waste Management	5,143	5,514	8,124
TOTAL DEFENSE ENVIRONMENTAL RESTORATION & WASTE MANAGEMENT	6,641	14,043	13,380
OTHER DEFENSE ACTIVITIES			
Verification and Control Technology			
Intelligence	15	0	0
TOTAL OTHER DEFENSE ACTIVITIES	15	0	0
TOTAL KANSAS CITY PLANT	296,822	328,513	290,480

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	FY 1995 COMPARABLE	FY 1996 COMPARABLE	FY 1997 REQUEST
KNOLLS ATOMIC POWER LABORATORY			
OTHER DEFENSE ACTIVITIES			
Naval Reactors			
Naval Reactors Development.....	288.285	271.868	261.700
TOTAL OTHER DEFENSE ACTIVITIES.....	288.285	271.868	261.700
TOTAL KNOLLS ATOMIC POWER LABORATORY.....	288.285	271.868	261.700

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LABORATORY OF RADIOBIOLOGY AND ENVIRONMENTAL HEALTH	FY 1995 COMPARABLE	FY 1996 COMPARABLE	FY 1997- REQUEST
ENERGY SUPPLY RESEARCH AND DEVELOPMENT ACTIVITIES			
Biological and Environmental Research			
Biological and Environmental Research.....	2.782	1.443	681
TOTAL ENERGY SUPPLY RESEARCH AND DEVELOPMENT ACTIVITIES.....	2.782	1.443	681
TOTAL LABORATORY OF RADIOBIOLOGY AND ENVIRONMENTAL HEALTH.....	2.782	1.443	681

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LAWRENCE BERKELEY LABORATORY	FY 1995 COMPARABLE	FY 1996 COMPARABLE	FY 1997 REQUEST
ENERGY SUPPLY RESEARCH AND DEVELOPMENT ACTIVITIES			
Solar and Renewable Energy			
Electric Energy Systems & Storage.....	300	300	200
Environment, Safety and Health			
Environment, Safety and Health.....	1,477	1,364	1,272
Environmental Restoration and Waste Management			
Environmental Restoration.....	3,672	4,160	3,676
Waste Management.....	8,725	5,153	6,134
Site Operations.....	518	424	365
Nuclear Materials & Facilities Stabilization.....	0	1,216	0
TOTAL Environmental Restoration and Waste Management.....	12,915	10,953	10,175
Biological and Environmental Research			
Biological and Environmental Research.....	46,353	35,177	24,049
Magnetic Fusion			
Fusion Energy Research.....	6,066	5,080	5,305
Supporting Research and Technical Analysis			
Basic Energy Sciences.....	54,398	62,866	62,011
Computational & Technology Research.....	15,248	30,535	50,929
TOTAL Supporting Research and Technical Analysis.....	69,646	93,401	112,940
Multiprogram Facilities Support			
Multiprogram Energy Labs - Facilities Support.....	6,183	5,823	1,330
In-House Energy Management			
In-House Energy Management.....	1,583	0	0
University & Science Education			
University & Science Education.....	2,969	825	1,050
TOTAL ENERGY SUPPLY RESEARCH AND DEVELOPMENT ACTIVITIES.....	147,492	152,923	156,321
GENERAL SCIENCE AND RESEARCH ACTIVITIES			
High Energy Physics			
High Energy Physics.....	23,111	21,393	20,983
Nuclear Physics			
Nuclear Physics.....	25,685	23,760	24,445
TOTAL GENERAL SCIENCE AND RESEARCH ACTIVITIES.....	48,796	45,153	45,428
DEFENSE ENVIRONMENTAL RESTORATION & WASTE MANAGEMENT			
Science and Technology			
Science and Technology.....	2,410	2,012	1,900
TOTAL DEFENSE ENVIRONMENTAL RESTORATION & WASTE MANAGEMENT.....	2,410	2,012	1,900
OTHER DEFENSE ACTIVITIES			
Environment, Safety, and Health			
Environment, Safety, and Health.....	33	0	0
TOTAL OTHER DEFENSE ACTIVITIES.....	33	0	0
DEPARTMENTAL ADMINISTRATION			
Office of Policy			
Environmental Policy Studies.....	295	194	0
Cost of Work for Others			
Cost of Work for Others.....	3,846	1,619	6,000
TOTAL DEPARTMENTAL ADMINISTRATION.....	4,141	1,813	6,000
FOSSIL ENERGY RESEARCH AND DEVELOPMENT			
Coal Research and Development			
Advanced Clean/Efficient Power Systems.....	560	350	324

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LAWRENCE BERKELEY LABORATORY

	FY 1995 COMPARABLE	FY 1996 COMPARABLE	FY 1997 REQUEST
Oil, Gas, and Shale Research and Development			
Natural Gas Research	524	150	450
Oil Technology	650	525	250
TOTAL Oil, Gas, and Shale Research and Development	1,174	675	700
TOTAL FOSSIL ENERGY RESEARCH AND DEVELOPMENT	1,734	1,025	1,024
ENERGY CONSERVATION			
Building Technologies, State, & Community Sector			
Research & Development	14,771	12,177	16,925
Industrial Technologies			
Industry Sector	700	1,025	3,300
Transportation Technologies			
Transportation Sector	2,395	2,000	2,500
Utility Technologies			
Utility Sector	1,819	0	0
Policy and Management			
Policy and Management - EE	99	100	56
Federal Energy Management Program			
Federal Energy Management Program	1,426	1,500	1,600
TOTAL ENERGY CONSERVATION	21,210	16,802	24,381
NUCLEAR WASTE FUND			
Nuclear Waste Disposal Fund			
Nuclear Waste Fund	4,915	3,105	4,300
TOTAL NUCLEAR WASTE FUND	4,915	3,105	4,300
DEFENSE NUCLEAR WASTE DISPOSAL			
Defense Nuclear Waste Disposal			
Defense Nuclear Waste Disposal	4,322	2,100	2,570
TOTAL DEFENSE NUCLEAR WASTE DISPOSAL	4,322	2,100	2,570
TOTAL LAWRENCE BERKELEY LABORATORY	235,053	224,933	241,924

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LAWRENCE LIVERMORE NATIONAL LABORATORY

	FY 1995 COMPARABLE	FY 1996 COMPARABLE	FY 1997 REQUEST
ENERGY SUPPLY RESEARCH AND DEVELOPMENT ACTIVITIES			
Solar and Renewable Energy			
Hydrogen Research R&D	1,100	1,100	1,000
Nuclear Fission			
Program Direction - NE	75	0	0
Isotope Support	13	0	0
TOTAL Nuclear Fission	88	0	0
Environment, Safety and Health			
Environment, Safety and Health	8,094	7,218	6,611
Biological and Environmental Research			
Biological and Environmental Research	21,326	21,508	19,285
Magnetic Fusion			
Fusion Energy Research	16,162	9,393	8,659
Supporting Research and Technical Analysis			
Basic Energy Sciences	5,709	5,658	4,910
Energy Research Analyses	5	0	0
Computational & Technology Research	47,738	22,534	1,635
TOTAL Supporting Research and Technical Analysis	53,452	28,192	6,545
In-House Energy Management			
In-House Energy Management	3,459	0	0
University & Science Education			
University & Science Education	1,548	395	500
TOTAL ENERGY SUPPLY RESEARCH AND DEVELOPMENT ACTIVITIES	105,229	67,806	42,600
URANIUM SUPPLY AND ENRICHMENT ACTIVITIES			
Uranium Supply and Enrichment Activities			
Uranium Supply and Enrichment Activities	7,490	5,820	14,655
TOTAL URANIUM SUPPLY AND ENRICHMENT ACTIVITIES	7,490	5,820	14,655
GENERAL SCIENCE AND RESEARCH ACTIVITIES			
High Energy Physics			
High Energy Physics	1,445	490	490
Nuclear Physics			
Nuclear Physics	812	640	720
TOTAL GENERAL SCIENCE AND RESEARCH ACTIVITIES	2,257	1,130	1,210
WEAPONS ACTIVITIES			
Program Direction			
Program Direction - DP	2,830	0	0
Stockpile Management			
Stockpile Management	30,548	35,146	44,700
Stockpile Stewardship			
Stockpile Stewardship	340,124	404,731	342,492*
TOTAL WEAPONS ACTIVITIES	373,502	439,877	387,192
DEFENSE ENVIRONMENTAL RESTORATION & WASTE MANAGEMENT			
Environmental Restoration			
Environmental Restoration	24,840	23,217	22,512
Waste Management			
Waste Management	41,892	45,704	33,009
Science and Technology			
Science and Technology	5,583	3,550	1,690
Site Operations			
Site Operations	1,528	1,060	1,055
TOTAL DEFENSE ENVIRONMENTAL RESTORATION & WASTE MANAGEMENT	73,843	73,531	58,266

* The FY 1997 requests for the National Ignition Facility (NIF) and Accelerated Strategic Computing Initiative (ASCI) are currently included in the estimate for Washington headquarters, pending final site selection.

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LAWRENCE LIVERMORE NATIONAL LABORATORY

	FY 1995 COMPARABLE	FY 1996 COMPARABLE	FY 1997 REQUEST
OTHER DEFENSE ACTIVITIES			
Verification and Control Technology			
Arms Control	16,150	20,796	24,918
Intelligence	6,416	6,366	6,010
Nonproliferation & Verification R&D	39,152	39,742	37,980
TOTAL Verification and Control Technology	61,718	66,904	68,908
Nuclear Safeguards and Security			
Security Affairs	3,309	3,008	3,239
Security Investigations			
Security Investigations	2,000	4,200	2,000
Fissile Materials Control & Disposition			
Fissile Materials Control & Disposition	7,160	8,540	13,300
Emergency Management			
Emergency Management	330	800	800
Environment, Safety, and Health			
Environment, Safety, and Health	1,328	1,295	1,328
TOTAL OTHER DEFENSE ACTIVITIES	75,845	84,747	89,575
DEPARTMENTAL ADMINISTRATION			
Office of Policy			
Environmental Policy Studies	10	7	0
Cost of Work for Others			
Cost of Work for Others	514	3,912	5,935
Human Resources & Administration			
Program Direction - HR	610	500	0
TOTAL DEPARTMENTAL ADMINISTRATION	1,134	4,419	5,935
OFFICE OF THE INSPECTOR GENERAL			
Office of the Inspector General			
Office of Inspector General	1,537	1,297	1,224
TOTAL OFFICE OF THE INSPECTOR GENERAL	1,537	1,297	1,224
FOSSIL ENERGY RESEARCH AND DEVELOPMENT			
Coal Research and Development			
Advanced Research and Tech. Development	204	0	0
Oil, Gas, and Shale Research and Development			
Natural Gas Research	150	0	0
Oil Technology	350	350	350
TOTAL Oil, Gas, and Shale Research and Development	500	350	350
TOTAL FOSSIL ENERGY RESEARCH AND DEVELOPMENT	704	350	350
ENERGY CONSERVATION			
Industrial Technologies			
Industry Sector	300	0	0
Transportation Technologies			
Transportation Sector	225	428	2,858
Federal Energy Management Program			
Federal Energy Management Program	5	5	5
TOTAL ENERGY CONSERVATION	530	433	2,863
NUCLEAR WASTE FUND			
Nuclear Waste Disposal Fund			
Nuclear Waste Fund	17,335	8,886	12,311
TOTAL NUCLEAR WASTE FUND	17,335	8,886	12,311

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LAWRENCE LIVERMORE NATIONAL LABORATORY	FY 1995 COMPARABLE	FY 1996 COMPARABLE	FY 1997 REQUEST
DEFENSE NUCLEAR WASTE DISPOSAL			
Defense Nuclear Waste Disposal			
Defense Nuclear Waste Disposal.....	15.363	6.006	7.351
TOTAL DEFENSE NUCLEAR WASTE DISPOSAL.....	15.363	6.006	7.351
TOTAL LAWRENCE LIVERMORE NATIONAL LABORATORY.....	674.769	694.302	623.532

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LOS ALAMOS NATIONAL LABORATORY

	FY 1995 COMPARABLE	FY 1996 COMPARABLE	FY 1997 REQUEST
ENERGY SUPPLY RESEARCH AND DEVELOPMENT ACTIVITIES			
Solar and Renewable Energy			
Geothermal Energy R&D.....	3,416	1,870	1,000
Electric Energy Systems & Storage.....	3,900	3,435	3,900
Hydrogen Research R&D.....	512	700	500
Solar and Renewable Energy Deployment.....	98	0	0
TOTAL Solar and Renewable Energy.....	7,926	6,005	5,400
Nuclear Fission			
Space Reactor Power Systems.....	40	0	0
Advanced Radioisotope Power Systems.....	12,630	12,215	13,800
Isotope Support.....	2,125	1,500	1,400
TOTAL Nuclear Fission.....	14,795	13,715	15,200
Environment, Safety and Health			
Environment, Safety and Health.....	1,093	985	917
Environmental Restoration and Waste Management			
Environmental Restoration.....	1,612	0	0
Biological and Environmental Research			
Biological and Environmental Research.....	25,305	20,343	20,602
Magnetic Fusion			
Fusion Energy Research.....	7,150	4,297	3,715
Supporting Research and Technical Analysis			
Basic Energy Sciences.....	11,655	19,280	17,272
Computational & Technology Research.....	14,105	12,907	13,763
TOTAL Supporting Research and Technical Analysis.....	25,760	32,187	31,035
University & Science Education			
University & Science Education.....	1,474	440	500
TOTAL ENERGY SUPPLY RESEARCH AND DEVELOPMENT ACTIVITIES.....	85,115	77,972	77,369
URANIUM SUPPLY AND ENRICHMENT ACTIVITIES			
Uranium Supply and Enrichment Activities			
Uranium Supply and Enrichment Activities.....	513	0	0
TOTAL URANIUM SUPPLY AND ENRICHMENT ACTIVITIES.....	513	0	0
GENERAL SCIENCE AND RESEARCH ACTIVITIES			
High Energy Physics			
High Energy Physics.....	1,005	806	913
Nuclear Physics			
Nuclear Physics.....	39,514	11,747	10,460
TOTAL GENERAL SCIENCE AND RESEARCH ACTIVITIES.....	40,519	12,553	11,373
WEAPONS ACTIVITIES			
Program Direction			
Program Direction - DP.....	7,407	3,925	3,700
Stockpile Management			
Stockpile Management.....	127,932	190,566	220,492
Stockpile Stewardship			
Stockpile Stewardship.....	314,593	357,417	352,526*
TOTAL WEAPONS ACTIVITIES.....	449,932	551,908	576,718
DEFENSE ENVIRONMENTAL RESTORATION & WASTE MANAGEMENT			
Environmental Restoration			
Environmental Restoration.....	83,385	59,421	48,484

* The FY 1997 requests for the National Ignition Facility (NIF) and Accelerated Strategic Computing Initiative (ASCI) are currently included in the estimate for Washington headquarters, pending final site selection.

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LDS ALAMOS NATIONAL LABORATORY	FY 1995 COMPARABLE	FY 1996 COMPARABLE	FY 1997 REQUEST
Waste Management			
Waste Management.....	63.284	60.563	53.633
Science and Technology			
Science and Technology.....	9.094	6.891	6.750
Site Operations			
Site Operations.....	1.713	0	0
Nuclear Materials & Facilities Stabilization			
Nuclear Materials & Facilities Stabilization.....	0	16.168	16.000
TOTAL DEFENSE ENVIRONMENTAL RESTORATION & WASTE MANAGEMENT.....	157.476	143.043	124.867
OTHER DEFENSE ACTIVITIES			
Verification and Control Technology			
Arms Control.....	17.391	29.384	39.461
Intelligence.....	5.398	5.348	5.050
Nonproliferation & Verification R&D.....	57.971	58.703	52.150
TOTAL Verification and Control Technology.....	80.760	93.435	96.661
Nuclear Safeguards and Security			
Security Affairs.....	7.131	7.429	6.965
Fissile Materials Control & Disposition			
Fissile Materials Control & Disposition.....	4.252	13.205	21.100
Emergency Management			
Emergency Management.....	.50	100	100
Environment, Safety, and Health			
Environment, Safety, and Health.....	25	25	25
TOTAL OTHER DEFENSE ACTIVITIES.....	92.218	114.194	124.851
DEPARTMENTAL ADMINISTRATION			
Office of Policy			
Environmental Policy Studies.....	145	95	0
TOTAL DEPARTMENTAL ADMINISTRATION.....	145	95	0
OFFICE OF THE INSPECTOR GENERAL			
Office of the Inspector General			
Office of Inspector General.....	543	457	350
TOTAL OFFICE OF THE INSPECTOR GENERAL.....	543	457	350
FOSSIL ENERGY RESEARCH AND DEVELOPMENT			
Oil, Gas, and Shale Research and Development			
Natural Gas Research.....	240	400	400
Oil Technology.....	265	265	203
TOTAL Oil, Gas, and Shale Research and Development.....	505	665	603
TOTAL FOSSIL ENERGY RESEARCH AND DEVELOPMENT.....	505	665	603
ENERGY CONSERVATION			
Industrial Technologies			
Industry Sector.....	4.715	4.456	2.763
Transportation Technologies			
Transportation Sector.....	2.366	700	3.450
Federal Energy Management Program			
Federal Energy Management Program.....	5	5	5
TOTAL ENERGY CONSERVATION.....	7.086	5.161	6.218
NUCLEAR WASTE FUND			
Nuclear Waste Disposal Fund			
Nuclear Waste Fund.....	20.740	9.822	13.609
TOTAL NUCLEAR WASTE FUND.....	20.740	9.822	13.609

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LOS ALAMOS NATIONAL LABORATORY	FY 1995 COMPARABLE	FY 1996 COMPARABLE	FY 1997 REQUEST
DEFENSE NUCLEAR WASTE DISPOSAL			
Defense Nuclear Waste Disposal			
Defense Nuclear Waste Disposal.....	9.982	6.637	8.124
TOTAL DEFENSE NUCLEAR WASTE DISPOSAL.....	9.982	6.637	8.124
TOTAL LOS ALAMOS NATIONAL LABORATORY.....	864.774	922.507	944.082

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	FY 1995 COMPARABLE	FY 1996 COMPARABLE	FY 1997 REQUEST
MORGANTOWN ENERGY TECHNOLOGY CENTER			
ENERGY SUPPLY RESEARCH AND DEVELOPMENT ACTIVITIES			
Solar and Renewable Energy			
Biofuels	0	1,000	1,500
TOTAL ENERGY SUPPLY RESEARCH AND DEVELOPMENT ACTIVITIES	0	1,000	1,500
DEFENSE ENVIRONMENTAL RESTORATION & WASTE MANAGEMENT			
Science and Technology			
Science and Technology	49,024	76,368	73,742
Program Direction			
Program Direction - EM	3,772	2,458	2,332
TOTAL DEFENSE ENVIRONMENTAL RESTORATION & WASTE MANAGEMENT	52,796	78,826	76,074
FOSSIL ENERGY RESEARCH AND DEVELOPMENT			
Coal Research and Development			
Advanced Research and Tech. Development	3,465	2,323	2,712
Advanced Clean Fuels Research	435	0	0
Advanced Clean/Efficient Power Systems	61,800	51,039	46,682
TOTAL Coal Research and Development	65,700	53,362	49,394
Oil, Gas, and Shale Research and Development			
Natural Gas Research	37,426	15,807	12,385
Fuel Cells	45,225	50,485	44,941
Oil Technology	2,770	1,727	1,144
TOTAL Oil, Gas, and Shale Research and Development	85,421	68,019	58,470
Program Direction and Management Support			
Energy Technology Center Program Direction	28,102	27,002	19,263
Cooperative R&D Ventures			
Cooperative R&D	7,625	6,295	4,000
Plant & Capital Equipment			
Plant - FE	2,440	0	0
Capital Equipment - FE	222	0	0
TOTAL Plant & Capital Equipment	2,662	0	0
TOTAL FOSSIL ENERGY RESEARCH AND DEVELOPMENT	189,510	154,678	131,127
ENERGY CONSERVATION			
Industrial Technologies			
Industry Sector	2,500	6,300	7,000
TOTAL ENERGY CONSERVATION	2,500	6,300	7,000
TOTAL MORGANTOWN ENERGY TECHNOLOGY CENTER	244,806	240,804	215,701

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MOUND PLANT	FY 1995 COMPARABLE	FY 1996 COMPARABLE	FY 1997 REQUEST
ENERGY SUPPLY RESEARCH AND DEVELOPMENT ACTIVITIES			
Nuclear Fission			
Advanced Radioisotope Power Systems.....	8,700	7,780	6,750
Isotope Support.....	1,300	1,200	500
TOTAL Nuclear Fission.....	10,000	8,980	7,250
Environmental Restoration and Waste Management			
Site Operations.....	974	1,061	1,223
In-House Energy Management			
In-House Energy Management.....	114	0	0
University & Science Education			
University & Science Education.....	100	25	0
TOTAL ENERGY SUPPLY RESEARCH AND DEVELOPMENT ACTIVITIES.....	11,188	10,066	8,473
WEAPONS ACTIVITIES			
Program Direction			
Program Direction - DP.....	500	0	0
Stockpile Stewardship			
Stockpile Stewardship.....	500	175	0
TOTAL WEAPONS ACTIVITIES.....	1,000	175	0
DEFENSE ENVIRONMENTAL RESTORATION & WASTE MANAGEMENT			
Site Operations			
Site Operations.....	93,481	98,141	86,242
TOTAL DEFENSE ENVIRONMENTAL RESTORATION & WASTE MANAGEMENT.....	93,481	98,141	86,242
OTHER DEFENSE ACTIVITIES			
Verification and Control Technology			
Arms Control.....	100	0	0
Nuclear Safeguards and Security			
Security Affairs.....	973	878	878
TOTAL OTHER DEFENSE ACTIVITIES.....	1,073	878	878
TOTAL MOUND PLANT.....	106,742	109,260	95,593

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MULTIPLE FIELD INSPECTION SITES	FY 1995 COMPARABLE	FY 1996 COMPARABLE	FY 1997 REQUEST
OFFICE OF THE INSPECTOR GENERAL			
Office of the Inspector General			
Office of Inspector General.....	8.673	8.687	9.263
TOTAL OFFICE OF THE INSPECTOR GENERAL.....	8.673	8.687	9.263
TOTAL MULTIPLE FIELD INSPECTION SITES.....	8.673	8.687	9.263

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NATIONAL RENEWABLE ENERGY LABORATORY

FY 1995
COMPARABLE FY 1996
COMPARABLE FY 1997
REQUEST

ENERGY SUPPLY RESEARCH AND DEVELOPMENT ACTIVITIES

Solar and Renewable Energy			
Solar Building Appliances R&D	2,893	875	1,900
Photovoltaic Systems R&D	47,000	38,000	50,746
Solar Thermal R&D	9,894	6,843	4,192
Biofuels	30,819	20,610	21,669
Wind Energy	35,579	24,837	40,150
Resource Assessment	3,272	1,690	0
National Renewable Energy Laboratory	5,963	2,000	5,000
Geothermal Energy R&D	1,105	600	600
Electric Energy Systems & Storage	1,026	845	950
Hydrogen Research R&D	2,713	3,000	1,168
Solar and Renewable Energy Deployment	5,791	1,300	3,250
TOTAL Solar and Renewable Energy	146,055	100,600	129,625

Supporting Research and Technical Analysis

Basic Energy Sciences	3,533	4,237	3,790
Computational & Technology Research	1,371	1,150	1,000

TOTAL Supporting Research and Technical Analysis	4,904	5,387	4,790
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In-House Energy Management

In-House Energy Management	147	0	0
University & Science Education	261	50	50

TOTAL ENERGY SUPPLY RESEARCH AND DEVELOPMENT ACTIVITIES	151,367	106,037	134,465
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DEPARTMENTAL ADMINISTRATION

Cost of Work for Others			
Cost of Work for Others	100	100	0

TOTAL DEPARTMENTAL ADMINISTRATION	100	100	0
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FOSSIL ENERGY RESEARCH AND DEVELOPMENT

Coal Research and Development			
Advanced Research and Tech. Development	198	99	100
Advanced Clean/Efficient Power Systems	150	0	0

TOTAL Coal Research and Development	348	99	100
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Oil, Gas, and Shale Research and Development

Oil Technology	60	100	100
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TOTAL FOSSIL ENERGY RESEARCH AND DEVELOPMENT	408	199	200
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ENERGY CONSERVATION

Building Technologies, State, & Community Sector			
Research & Development	7,195	6,606	12,700
Grants	237	0	0

TOTAL Building Technologies, State, & Community Sector	7,432	6,606	12,700
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Industrial Technologies

Industry Sector	9,153	3,786	4,268
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Transportation Technologies

Transportation Sector	49,889	47,450	64,800
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Utility Technologies

Utility Sector	1,784	0	0
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Policy and Management

Policy and Management - EE	1,140	1,100	1,013
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NATIONAL RENEWABLE ENERGY LABORATORY	FY 1995 COMPARABLE	FY 1996 COMPARABLE	FY 1997 REQUEST
Federal Energy Management Program			
Federal Energy Management Program	6.364	6.500	6.700
TOTAL ENERGY CONSERVATION	75.762	65.442	89.481
TOTAL NATIONAL RENEWABLE ENERGY LABORATORY	227.637	171.778	224.146

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NAVAL OIL SHALE RESERVE NO 1	FY 1995 COMPARABLE	FY 1996 COMPARABLE	FY 1997 REQUEST
NAVAL PETROLEUM AND OIL SHALE RESERVES			
Naval Petroleum and Oil Shale Reserves			
Naval Petroleum and Oil Shale Reserves.....	113	0	120
TOTAL NAVAL PETROLEUM AND OIL SHALE RESERVES.....	113	0	120
TOTAL NAVAL OIL SHALE RESERVE NO 1.....	113	0	120

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NAVAL OIL SHALE RESERVE NO 2

	FY 1995 COMPARABLE	FY 1996 COMPARABLE	FY 1997 REQUEST
NAVAL PETROLEUM AND OIL SHALE RESERVES			
Naval Petroleum and Oil Shale Reserves			
Naval Petroleum and Oil Shale Reserves.....	32	0	35
TOTAL NAVAL PETROLEUM AND OIL SHALE RESERVES.....	32	0	35
TOTAL NAVAL OIL SHALE RESERVE NO 2.....	32	0	35

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NAVAL OIL SHALE RESERVE NO 3	FY 1995 COMPARABLE	FY 1996 COMPARABLE	FY 1997 REQUEST
NAVAL PETROLEUM AND OIL SHALE RESERVES			
Naval Petroleum and Oil Shale Reserves			
Naval Petroleum and Oil Shale Reserves.....	2.151	0	1.245
TOTAL NAVAL PETROLEUM AND OIL SHALE RESERVES.....	2.151	0	1.245
TOTAL NAVAL OIL SHALE RESERVE NO 3.....	2.151	0	1.245

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NAVAL PETROLEUM RESERVE NO 1

	FY 1995 COMPARABLE	FY 1996 COMPARABLE	FY 1997 REQUEST
NAVAL PETROLEUM AND OIL SHALE RESERVES			
Naval Petroleum and Oil Shale Reserves			
Naval Petroleum and Oil Shale Reserves.....	166,537	129,686	136,200
TOTAL NAVAL PETROLEUM AND OIL SHALE RESERVES.....	166,537	129,686	136,200
TOTAL NAVAL PETROLEUM RESERVE NO 1.....	166,537	129,686	136,200

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NAVAL PETROLEUM RESERVE NO 3	FY 1995 COMPARABLE	FY 1996 COMPARABLE	FY 1997 REQUEST
NAVAL PETROLEUM AND OIL SHALE RESERVES			
Naval Petroleum and Oil Shale Reserves			
Naval Petroleum and Oil Shale Reserves.....	14.075	16.800	9.600
TOTAL NAVAL PETROLEUM AND OIL SHALE RESERVES.....	14.075	16.800	9.600
TOTAL NAVAL PETROLEUM RESERVE NO 3.....	14.075	16.800	9.600

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NAVAL RESEARCH LABORATORY	FY 1995 COMPARABLE	FY 1996 COMPARABLE	FY 1997 REQUEST
WEAPONS ACTIVITIES			
Stockpile Stewardship			
Stockpile Stewardship.....	8.950	8.500	8.156
TOTAL WEAPONS ACTIVITIES.....	8.950	8.500	8.156
TOTAL NAVAL RESEARCH LABORATORY.....	8.950	8.500	8.156
	=====	=====	=====

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NEVADA OPERATIONS OFFICE	FY 1995 COMPARABLE	FY 1996 COMPARABLE	FY 1997 REQUEST
ENERGY SUPPLY RESEARCH AND DEVELOPMENT ACTIVITIES			
Nuclear Fission			
Advanced Radioisotope Power Systems	300	285	1.085
TOTAL ENERGY SUPPLY RESEARCH AND DEVELOPMENT ACTIVITIES	300	285	1.085
URANIUM SUPPLY AND ENRICHMENT ACTIVITIES			
Uranium Supply and Enrichment Activities			
Uranium Supply and Enrichment Activities	506	0	380
TOTAL URANIUM SUPPLY AND ENRICHMENT ACTIVITIES	506	0	380
WEAPONS ACTIVITIES			
Program Direction			
Program Direction - DP	40.215	38.490	38.165
Stockpile Management			
Stockpile Management	30.545	33.545	34.175
Stockpile Stewardship			
Stockpile Stewardship	200.481	183.122	163.525
TOTAL WEAPONS ACTIVITIES	271.241	255.157	235.865
DEFENSE ENVIRONMENTAL RESTORATION & WASTE MANAGEMENT			
Environmental Restoration			
Environmental Restoration	34.543	47.891	53.192
Waste Management			
Waste Management	0	1.097	1.762
Science and Technology			
Science and Technology	2.841	2.682	1.791
Site Operations			
Site Operations	2.418	1.085	2.650
Program Direction			
Program Direction - EM	6.972	7.395	7.495
Environmental Management Science Program			
Environmental Management Science Program	200	200	0
TOTAL DEFENSE ENVIRONMENTAL RESTORATION & WASTE MANAGEMENT	46.974	60.350	66.890
OTHER DEFENSE ACTIVITIES			
Verification and Control Technology			
Arms Control	350	0	0
Intelligence	6.534	6.510	6.180
Nonproliferation & Verification R&D	4.164	3.700	2.050
TOTAL Verification and Control Technology	11.048	10.210	8.230
Nuclear Safeguards and Security			
Security Affairs	0	300	150
Security Investigations			
Security Investigations	1.000	700	600
Worker and Community Transition			
Worker and Community Transition	16.587	6.500	0
Fissile Materials Control & Disposition			
Fissile Materials Control & Disposition	0	25	0
Emergency Management			
Emergency Management	2.740	3.900	3.900
Program Direction			
Program Direction - NN	1.093	1.128	1.153
TOTAL OTHER DEFENSE ACTIVITIES	32.468	22.763	14.033
OFFICE OF THE INSPECTOR GENERAL			
Office of the Inspector General			
Office of Inspector General	635	457	526
TOTAL OFFICE OF THE INSPECTOR GENERAL	635	457	526

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NEVADA OPERATIONS OFFICE	FY 1995 COMPARABLE	FY 1996 COMPARABLE	FY 1997 REQUEST
NAVAL PETROLEUM AND OIL SHALE RESERVES			
Naval Petroleum and Oil Shale Reserves			
Naval Petroleum and Oil Shale Reserves	1.700	0	0
TOTAL NAVAL PETROLEUM AND OIL SHALE RESERVES	1.700	0	0
ENERGY CONSERVATION			
Transportation Technologies			
Transportation Sector	3.278	2.190	0
TOTAL ENERGY CONSERVATION	3.278	2.190	0
NUCLEAR WASTE FUND			
Nuclear Waste Disposal Fund			
Nuclear Waste Fund	99.389	44.519	62.587
Program Direction - RW	694	348	682
TOTAL Nuclear Waste Disposal Fund	100.083	44.867	63.269
TOTAL NUCLEAR WASTE FUND	100.083	44.867	63.269
DEFENSE NUCLEAR WASTE DISPOSAL			
Defense Nuclear Waste Disposal			
Defense Nuclear Waste Disposal	20.107	23.934	29.292
TOTAL DEFENSE NUCLEAR WASTE DISPOSAL	20.107	23.934	29.292
TOTAL NEVADA OPERATIONS OFFICE	477.292	410.003	411.340

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NEVADA TEST SITE

	FY 1995 COMPARABLE	FY 1996 COMPARABLE	FY 1997 REQUEST
ENERGY SUPPLY RESEARCH AND DEVELOPMENT ACTIVITIES			
In-House Energy Management			
In-House Energy Management.....	595	0	0
TOTAL ENERGY SUPPLY RESEARCH AND DEVELOPMENT ACTIVITIES	595	0	0
DEFENSE ENVIRONMENTAL RESTORATION & WASTE MANAGEMENT			
Waste Management			
Waste Management.....	21,553	14,415	14,841
Site Operations			
Site Operations.....	810	672	200
TOTAL DEFENSE ENVIRONMENTAL RESTORATION & WASTE MANAGEMENT.....	22,363	15,087	15,041
OTHER DEFENSE ACTIVITIES			
Emergency Management			
Emergency Management.....	1,200	2,600	2,600
TOTAL OTHER DEFENSE ACTIVITIES.....	1,200	2,600	2,600
DEPARTMENTAL ADMINISTRATION			
Human Resources & Administration			
Program Direction - HR.....	1,420	0	0
TOTAL DEPARTMENTAL ADMINISTRATION.....	1,420	0	0
NUCLEAR WASTE FUND			
Nuclear Waste Disposal Fund			
Nuclear Waste Fund.....	4,795	7,000	9,700
TOTAL NUCLEAR WASTE FUND.....	4,795	7,000	9,700
DEFENSE NUCLEAR WASTE DISPOSAL			
Defense Nuclear Waste Disposal			
Defense Nuclear Waste Disposal.....	1,302	4,730	5,790
TOTAL DEFENSE NUCLEAR WASTE DISPOSAL.....	1,302	4,730	5,790
TOTAL NEVADA TEST SITE.....	31,675	29,417	33,131

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NEW BRUNSWICK LABORATORY

	FY 1995 COMPARABLE	FY 1996 COMPARABLE	FY 1997 REQUEST
URANIUM SUPPLY AND ENRICHMENT ACTIVITIES			
Uraniun Supply and Enrichment Activities			
Uraniun Supply and Enrichment Activities	0	50	0
Program Direction - NE	68	250	700
TOTAL Uraniun Supply and Enrichment Activities	68	300	700
TOTAL URANIUM SUPPLY AND ENRICHMENT ACTIVITIES	68	300	700
OTHER DEFENSE ACTIVITIES			
Verification and Control Technology			
Arms Control	0	235	260
Program Direction			
Program Direction - NN	4,295	4,295	3,907
TOTAL OTHER DEFENSE ACTIVITIES	4,295	4,530	4,167
DEPARTMENTAL ADMINISTRATION			
Cost of Work for Others			
Cost of Work for Others	100	150	100
TOTAL DEPARTMENTAL ADMINISTRATION	100	150	100
TOTAL NEW BRUNSWICK LABORATORY	4,463	4,980	4,967

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OAK RIDGE INSTITUTE FOR SCIENCE & EDUCATION

	FY 1995 COMPARABLE	FY 1996 COMPARABLE	FY 1997 REQUEST
ENERGY SUPPLY RESEARCH AND DEVELOPMENT ACTIVITIES			
Nuclear Fission			
Program Direction - NE	1.125	0	0
Isotope Support	64	0	0
TOTAL Nuclear Fission	1.189	0	0
Environment, Safety and Health			
Environment, Safety and Health	7.608	6.898	6.431
Biological and Environmental Research			
Biological and Environmental Research	6.994	3.050	6.112
Magnetic Fusion			
Fusion Energy Research	1.100	1.000	0
Supporting Research and Technical Analysis			
Basic Energy Sciences	455	725	424
Multiprogram Facilities Support			
Multiprogram Energy Labs - Facilities Support	215	90	0
In-House Energy Management			
In-House Energy Management	140	0	0
Program Direction - ER			
Program Direction - ER	150	0	0
University & Science Education			
University & Science Education	6.504	3.957	3.700
TOTAL ENERGY SUPPLY RESEARCH AND DEVELOPMENT ACTIVITIES	24.355	15.720	16.667
URANIUM SUPPLY AND ENRICHMENT ACTIVITIES			
Uranium Supply and Enrichment Activities			
Uranium Supply and Enrichment Activities	6	579	0
TOTAL URANIUM SUPPLY AND ENRICHMENT ACTIVITIES	6	579	0
GENERAL SCIENCE AND RESEARCH ACTIVITIES			
Nuclear Physics			
Nuclear Physics	710	415	450
TOTAL GENERAL SCIENCE AND RESEARCH ACTIVITIES	710	415	450
WEAPONS ACTIVITIES			
Program Direction			
Program Direction - DP	1.068	440	695
Stockpile Management			
Stockpile Management	946	1.357	1.354
TOTAL WEAPONS ACTIVITIES	2.014	1.797	2.049
DEFENSE ENVIRONMENTAL RESTORATION & WASTE MANAGEMENT			
Environmental Restoration			
Environmental Restoration	627	11	0
Science and Technology			
Science and Technology	141	0	0
TOTAL DEFENSE ENVIRONMENTAL RESTORATION & WASTE MANAGEMENT	768	11	0
OTHER DEFENSE ACTIVITIES			
Nuclear Safeguards and Security			
Security Affairs	563	563	563
Security Investigations			
Security Investigations	200	385	385
Emergency Management			
Emergency Management	1.850	1.800	1.800

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OAK RIDGE INSTITUTE FOR SCIENCE & EDUCATION	FY 1995 COMPARABLE	FY 1996 COMPARABLE	FY 1997 REQUEST
Environment, Safety, and Health			
Environment, Safety, and Health.....	60	30	30
TOTAL OTHER DEFENSE ACTIVITIES.....	2.673	2.778	2.778
NUCLEAR WASTE FUND			
Nuclear Waste Disposal Fund			
Nuclear Waste Fund.....	176	25	26
TOTAL NUCLEAR WASTE FUND.....	176	25	26
TOTAL OAK RIDGE INSTITUTE FOR SCIENCE & EDUCATION.....	30.702	21.325	21.970

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OAK RIDGE NATIONAL LABORATORY	FY 1995 COMPARABLE	FY 1996 COMPARABLE	FY 1997 REQUEST
ENERGY SUPPLY RESEARCH AND DEVELOPMENT ACTIVITIES			
- Solar and Renewable Energy			
Biofuels.....	4,980	4,920	6,400
Geothermal Energy R&D.....	49	50	50
Electric Energy Systems & Storage.....	13,069	8,092	7,600
Hydrogen Research R&D.....	400	485	276
TOTAL Solar and Renewable Energy.....	18,498	13,547	14,326
Nuclear Fission			
Light Water Reactors.....	614	0	0
Advanced Reactor R&D.....	1,364	0	0
Space Reactor Power Systems.....	5	0	0
Advanced Radioisotope Power Systems.....	5,808	3,730	3,060
Program Direction - NE.....	15	0	0
Termination Costs.....	1,112	1,035	2,500
Isotope Support.....	3,620	2,200	2,000
TOTAL Nuclear Fission.....	12,538	6,965	7,560
Environment, Safety and Health			
Environment, Safety and Health.....	16,022	14,726	13,716
Environmental Restoration and Waste Management			
Environmental Restoration.....	46,629	29,662	36,734
Waste Management.....	51,505	11,157	14,414
Nuclear Materials & Facilities Stabilization.....	9,668	13,913	14,638
TOTAL Environmental Restoration and Waste Management.....	107,802	54,732	65,786
Biological and Environmental Research			
Biological and Environmental Research.....	24,170	21,694	21,436
Magnetic Fusion			
Fusion Energy Research.....	27,863	19,477	19,300
Supporting Research and Technical Analysis			
Basic Energy Sciences.....	83,590	85,344	90,502
Advanced Neutron Source.....	12,832	0	0
Energy Research Analyses.....	644	200	0
Computational & Technology Research.....	22,780	13,840	11,969
TOTAL Supporting Research and Technical Analysis.....	119,846	99,384	102,471
Multiprogram Facilities Support			
Multiprogram Energy Labs - Facilities Support.....	4,264	3,934	2,635
In-House Energy Management			
In-House Energy Management.....	1,963	0	200
University & Science Education			
University & Science Education.....	1,420	737	800
TOTAL ENERGY SUPPLY RESEARCH AND DEVELOPMENT ACTIVITIES.....	334,386	235,196	248,230
URANIUM SUPPLY AND ENRICHMENT ACTIVITIES			
Uranium Supply and Enrichment Activities.....	1,082	0	0
TOTAL URANIUM SUPPLY AND ENRICHMENT ACTIVITIES.....	1,082	0	0
GENERAL SCIENCE AND RESEARCH ACTIVITIES			
High Energy Physics			
High Energy Physics.....	470	250	406
Nuclear Physics			
Nuclear Physics.....	12,384	13,585	14,385
TOTAL GENERAL SCIENCE AND RESEARCH ACTIVITIES.....	12,854	13,835	14,791

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OAK RIDGE NATIONAL LABORATORY	FY 1995 COMPARABLE	FY 1996 COMPARABLE	FY 1997 REQUEST
WEAPONS ACTIVITIES			
Program Direction			
Program Direction - DP	-338	300	200
Stockpile Management			
Stockpile Management	9.853	9.643	11.943
Stockpile Stewardship			
Stockpile Stewardship	421	600	300
TOTAL WEAPONS ACTIVITIES	10.612	10.543	12.443
DEFENSE ENVIRONMENTAL RESTORATION & WASTE MANAGEMENT			
Environmental Restoration			
Environmental Restoration	19.593	25.484	28.488
Waste Management			
Waste Management	60.366	59.045	48.636
Science and Technology			
Science and Technology	26.194	22.620	12.295
Site Operations			
Site Operations	6.790	1.925	2.036
Nuclear Materials & Facilities Stabilization			
Nuclear Materials & Facilities Stabilization	1.900	1.280	1.380
TOTAL DEFENSE ENVIRONMENTAL RESTORATION & WASTE MANAGEMENT	114.843	110.354	92.835
OTHER DEFENSE ACTIVITIES			
Verification and Control Technology			
Arms Control	4.499	14.686	19.615
Nonproliferation & Verification R&D	5.551	4.828	3.190
TOTAL Verification and Control Technology	10.050	19.514	22.805
Fissile Materials Control & Disposition			
Fissile Materials Control & Disposition	3.607	5.155	13.500
Environment, Safety, and Health			
Environment, Safety, and Health	553	250	250
TOTAL OTHER DEFENSE ACTIVITIES	14.210	24.919	36.555
DEPARTMENTAL ADMINISTRATION			
Office of Policy			
Environmental Policy Studies	552	364	0
Cost of Work for Others			
Cost of Work for Others	4.049	1.411	841
Economic Impact & Diversity			
Minority Economic Impact	70	0	50
TOTAL DEPARTMENTAL ADMINISTRATION	4.671	1.775	891
FOSSIL ENERGY RESEARCH AND DEVELOPMENT			
Coal Research and Development			
Advanced Research and Tech. Development	6.539	5.624	4.239
Advanced Clean/Efficient Power Systems	20	0	0
TOTAL Coal Research and Development	6.559	5.624	4.239
Oil, Gas, and Shale Research and Development			
Natural Gas Research	1.000	1.500	1.500
TOTAL FOSSIL ENERGY RESEARCH AND DEVELOPMENT	7.559	7.124	5.739
ENERGY CONSERVATION			
Building Technologies, State, & Community Sector			
Research & Development	18.011	16.946	20.510
Grants	513	400	0
TOTAL Building Technologies, State, & Community Sector	18.524	17.346	20.510

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OAK RIDGE NATIONAL LABORATORY	FY 1995 COMPARABLE	FY 1996 COMPARABLE	FY 1997 REQUEST
Industrial Technologies			
Industry Sector.....	19,497	21,808	19,975
Transportation Technologies			
Transportation Sector.....	34,631	32,819	38,784
Utility Technologies			
Utility Sector.....	1,000	0	0
Policy and Management			
Policy and Management - EE.....	444	1,100	847
Federal Energy Management Program			
Federal Energy Management Program.....	165	800	1,500
TOTAL ENERGY CONSERVATION.....	74,261	73,873	81,616
NUCLEAR WASTE FUND			
Nuclear Waste Disposal Fund			
Nuclear Waste Fund.....	563	0	0
TOTAL NUCLEAR WASTE FUND.....	563	0	0
STRATEGIC PETROLEUM RESERVE			
SPR - Facilities Development			
SPR - Facilities Development.....	125	100	100
TOTAL STRATEGIC PETROLEUM RESERVE.....	125	100	100
ENERGY INFORMATION ADMINISTRATION			
Energy Information Administration			
National Energy Information System.....	213	181	154
TOTAL ENERGY INFORMATION ADMINISTRATION.....	213	181	154
TOTAL OAK RIDGE NATIONAL LABORATORY.....	575,379	477,900	493,354

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OAK RIDGE OPERATIONS OFFICE	FY 1995 COMPARABLE	FY 1996 COMPARABLE	FY 1997 REQUEST
ENERGY SUPPLY RESEARCH AND DEVELOPMENT ACTIVITIES			
Solar and Renewable Energy			
Biofuels	1,275	1,400	1,300
Nuclear Fission			
Light Water Reactors	34	38	0
Advanced Radioisotope Power Systems	120	150	0
Oak Ridge Landlord	14,224	14,400	16,000
Program Direction - NE	1,250	1,304	1,264
TOTAL Nuclear Fission	15,628	15,892	17,264
Environmental Restoration and Waste Management			
Environmental Restoration	77,360	79,931	88,357
Biological and Environmental Research			
Biological and Environmental Research	13,157	9,280	8,676
Magnetic Fusion			
Fusion Energy Research	3,016	130	40
Supporting Research and Technical Analysis			
Basic Energy Sciences	15,596	11,184	12,714
Energy Research Analyses	285	194	0
Computational & Technology Research	3,870	3,078	2,734
TOTAL Supporting Research and Technical Analysis	19,751	14,456	15,448
In-House Energy Management			
In-House Energy Management	1,277	0	800
University & Science Education			
University & Science Education	4,914	525	0
Field Offices and Management			
Oak Ridge Operations Office	37,175	33,530	36,484
TOTAL ENERGY SUPPLY RESEARCH AND DEVELOPMENT ACTIVITIES	173,553	155,144	168,369
URANIUM SUPPLY AND ENRICHMENT ACTIVITIES			
Uranium Supply and Enrichment Activities			
Uranium Supply and Enrichment Activities	5,370	1,609	9,193
Program Direction - NE	2,430	2,000	2,734
TOTAL Uranium Supply and Enrichment Activities	7,800	3,609	11,927
TOTAL URANIUM SUPPLY AND ENRICHMENT ACTIVITIES	7,800	3,609	11,927
URANIUM ENRICHMENT DECON. & DECOM. FUND			
Uranium Enrichment D & D Fund			
UE Decontamination & Decommissioning Fund	33,664	38,902	32,735
TOTAL URANIUM ENRICHMENT DECON. & DECOM. FUND	33,664	38,902	32,735
GENERAL SCIENCE AND RESEARCH ACTIVITIES			
High Energy Physics			
High Energy Physics	7,297	6,893	7,428
Nuclear Physics			
Nuclear Physics	2,314	2,131	2,152
General Science Program Direction			
General Science Program Direction	979	874	844
TOTAL GENERAL SCIENCE AND RESEARCH ACTIVITIES	10,590	9,898	10,424
WEAPONS ACTIVITIES			
Program Direction			
Program Direction - DP	13,290	9,300	10,700

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OAK RIDGE OPERATIONS OFFICE	FY 1995 COMPARABLE	FY 1996 COMPARABLE	FY 1997 REQUEST
Stockpile Management			
Stockpile Management	7,630	6,550	4,235
Stockpile Stewardship			
Stockpile Stewardship	370	0	0
TOTAL WEAPONS ACTIVITIES	21,290	15,850	14,935
DEFENSE ENVIRONMENTAL RESTORATION & WASTE MANAGEMENT			
Environmental Restoration			
Environmental Restoration	9,082	12,942	10,443
Waste Management			
Waste Management	35,703	41,402	37,144
Science and Technology			
Science and Technology	962	4,946	8,773
Site Operations			
Site Operations	825	0	200
Program Direction			
Program Direction - EM	20,380	20,835	19,477
Nuclear Materials & Facilities Stabilization			
Nuclear Materials & Facilities Stabilization	0	150	0
Policy and Management			
Policy and Management	30	250	260
Environmental Management Science Program			
Environmental Management Science Program	0	550	0
TOTAL DEFENSE ENVIRONMENTAL RESTORATION & WASTE MANAGEMENT	67,002	81,075	76,297
OTHER DEFENSE ACTIVITIES			
Nuclear Safeguards and Security			
Security Affairs	3,974	3,176	2,930
Security Investigations			
Security Investigations	5,300	0	2,800
Naval Reactors			
Enriched Materials	32,000	0	0
Worker and Community Transition			
Worker and Community Transition	2,932	428	0
Fissile Materials Control & Disposition			
Fissile Materials Control & Disposition	4,175	9,855	650
TOTAL OTHER DEFENSE ACTIVITIES	48,381	13,459	6,380
DEPARTMENTAL ADMINISTRATION			
Cost of Work for Others			
Cost of Work for Others	3,185	3,906	2,822
Human Resources & Administration			
Program Direction - HR	405	405	405
Economic Impact & Diversity			
Minority Economic Impact	625	50	50
TOTAL DEPARTMENTAL ADMINISTRATION	4,215	4,361	3,277
OFFICE OF THE INSPECTOR GENERAL			
Office of the Inspector General			
Office of Inspector General	3,761	2,824	2,974
TOTAL OFFICE OF THE INSPECTOR GENERAL	3,761	2,824	2,974
FOSSIL ENERGY RESEARCH AND DEVELOPMENT			
Coal Research and Development			
Advanced Research and Tech. Development	203	169	153
TOTAL FOSSIL ENERGY RESEARCH AND DEVELOPMENT	203	169	153

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OAK RIDGE OPERATIONS OFFICE	FY 1995 COMPARABLE	FY 1996 COMPARABLE	FY 1997 REQUEST
ENERGY CONSERVATION			
Industrial Technologies			
Industry Sector	92	61	43
Transportation Technologies			
Transportation Sector	154	100	100
TOTAL ENERGY CONSERVATION	246	161	143
NUCLEAR WASTE FUND			
Nuclear Waste Disposal Fund			
Nuclear Waste Fund	728	255	264
Program Direction - RW	89	71	0
TOTAL Nuclear Waste Disposal Fund	817	326	264
TOTAL NUCLEAR WASTE FUND	817	326	264
TOTAL OAK RIDGE OPERATIONS OFFICE	371.522	325.778	327.878

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OAK RIDGE RESERVATION

	FY 1995 COMPARABLE	FY 1996 COMPARABLE	FY 1997 REQUEST
ENERGY SUPPLY RESEARCH AND DEVELOPMENT ACTIVITIES			
Environmental Restoration and Waste Management			
Environmental Restoration.....	2.116	578	0
TOTAL ENERGY SUPPLY RESEARCH AND DEVELOPMENT ACTIVITIES.....	2.116	578	0
URANIUM ENRICHMENT DECON. & DECOM. FUND			
Uranium Enrichment D & D Fund			
UE Decontamination & Decommissioning Fund.....	2.116	579	3.410
TOTAL URANIUM ENRICHMENT DECON. & DECOM. FUND.....	2.116	579	3.410
DEFENSE ENVIRONMENTAL RESTORATION & WASTE MANAGEMENT			
Environmental Restoration			
Environmental Restoration.....	7.180	6.863	9.272
Site Operations			
Site Operations.....	450	3.665	3.053
TOTAL DEFENSE ENVIRONMENTAL RESTORATION & WASTE MANAGEMENT.....	7.630	10.528	12.325
TOTAL OAK RIDGE RESERVATION.....	11.862	11.685	15.735

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OAKLAND OPERATIONS OFFICE

	FY 1995 COMPARABLE	FY 1996 COMPARABLE	FY 1997 REQUEST
ENERGY SUPPLY RESEARCH AND DEVELOPMENT ACTIVITIES			
Nuclear Fission			
Light Water Reactors.....	23,830	16,800	11,800
Advanced Reactor R&D.....	8,639	0	0
Space Reactor Power Systems.....	555	0	0
Advanced Radioisotope Power Systems.....	5,130	3,500	4,135
Program Direction - NE.....	512	520	400
Termination Costs.....	0	6,270	3,250
Isotope Support.....	24	0	0
TOTAL Nuclear Fission.....	38,690	27,090	19,585
Environmental Restoration and Waste Management			
Environmental Restoration.....	6,104	7,632	9,141
Waste Management.....	2,289	533	650
TOTAL Environmental Restoration and Waste Management.....	8,393	8,165	9,791
Biological and Environmental Research			
Biological and Environmental Research.....	38,412	32,622	27,717
Magnetic Fusion			
Fusion Energy Research.....	75,264	60,599	61,185
Supporting Research and Technical Analysis			
Basic Energy Sciences.....	21,876	21,344	21,213
Energy Research Analyses.....	89	0	0
Computational & Technology Research.....	5,668	4,638	1,785
TOTAL Supporting Research and Technical Analysis.....	27,633	25,982	22,998
In-House Energy Management			
In-House Energy Management.....	27	0	0
Program Direction - ER			
Program Direction - ER.....	306	187	239
University & Science Education			
University & Science Education.....	3,201	236	0
Field Offices and Management			
Field Offices and Management.....	24,828	24,489	23,249
TOTAL ENERGY SUPPLY RESEARCH AND DEVELOPMENT ACTIVITIES.....	107,754	179,370	164,764
URANIUM SUPPLY AND ENRICHMENT ACTIVITIES			
Uranium Supply and Enrichment Activities			
Uranium Supply and Enrichment Activities.....	1,003	2,500	0
Program Direction - NE.....	165	102	110
TOTAL Uranium Supply and Enrichment Activities.....	1,168	2,602	110
TOTAL URANIUM SUPPLY AND ENRICHMENT ACTIVITIES.....	1,168	2,602	110
GENERAL SCIENCE AND RESEARCH ACTIVITIES			
High Energy Physics			
High Energy Physics.....	29,492	28,922	30,088
Nuclear Physics			
Nuclear Physics.....	9,051	9,150	8,848
General Science Program Direction			
General Science Program Direction.....	809	664	725
TOTAL GENERAL SCIENCE AND RESEARCH ACTIVITIES.....	39,352	38,736	39,661
WEAPONS ACTIVITIES			
Program Direction			
Program Direction - DP.....	17,930	15,805	16,090

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OAKLAND OPERATIONS OFFICE	FY 1995 COMPARABLE	FY 1996 COMPARABLE	FY 1997 REQUEST
Stockpile Management			
Stockpile Management.....	222	220	269
Stockpile Stewardship			
Stockpile Stewardship.....	36,542	44,676	32,109
TOTAL WEAPONS ACTIVITIES.....	54,694	60,701	48,468
DEFENSE ENVIRONMENTAL RESTORATION & WASTE MANAGEMENT			
Environmental Restoration			
Environmental Restoration.....	497	375	569
Waste Management			
Waste Management.....	2,243	2,318	1,095
Science and Technology			
Science and Technology.....	802	600	1,074
Program Direction			
Program Direction - EM.....	9,482	10,346	9,385
Nuclear Materials & Facilities Stabilization			
Nuclear Materials & Facilities Stabilization.....	234	1,625	0
Policy and Management			
Policy and Management.....	263	203	265
TOTAL DEFENSE ENVIRONMENTAL RESTORATION & WASTE MANAGEMENT.....	13,521	15,467	12,388
OTHER DEFENSE ACTIVITIES			
Security Investigations			
Security Investigations.....	2,700	1,502	1,700
Worker and Community Transition			
Worker and Community Transition.....	387	735	0
Fissile Materials Control & Disposition			
Fissile Materials Control & Disposition.....	0	1,400	0
TOTAL OTHER DEFENSE ACTIVITIES.....	3,087	3,637	1,700
DEPARTMENTAL ADMINISTRATION			
Cost of Work for Others			
Cost of Work for Others.....	4,025	2,500	2,400
Economic Impact & Diversity			
Minority Economic Impact.....	225	403	400
TOTAL DEPARTMENTAL ADMINISTRATION.....	4,250	2,903	2,800
FOSSIL ENERGY RESEARCH AND DEVELOPMENT			
Coal Research and Development			
Advanced Research and Tech. Development.....	100	33	30
TOTAL FOSSIL ENERGY RESEARCH AND DEVELOPMENT.....	100	33	30
TOTAL OAKLAND OPERATIONS OFFICE.....	332,926	303,449	269,921

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OFFICE OF SCIENTIFIC & TECHNICAL INFORMATION

	FY 1995 COMPARABLE	FY 1996 COMPARABLE	FY 1997 REQUEST
ENERGY SUPPLY RESEARCH AND DEVELOPMENT ACTIVITIES.			
Nuclear Fission			
Program Direction - NE	30	0	0
Technical Information Management Program			
Technical Information Management Program	5,795	3,176	3,300
Program Direction	10,200	8,800	8,700
TOTAL Technical Information Management Program	15,995	11,976	12,000
Program Direction - ER			
Program Direction - ER	25	0	0
TOTAL ENERGY SUPPLY RESEARCH AND DEVELOPMENT ACTIVITIES	16,050	11,976	12,000
WEAPONS ACTIVITIES			
Stockpile Stewardship			
Stockpile Stewardship	0	10	0
TOTAL WEAPONS ACTIVITIES	0	10	0
OTHER DEFENSE ACTIVITIES			
Verification and Control Technology			
Arms Control	50	20	20
Intelligence	76	25	25
TOTAL Verification and Control Technology	126	45	45
Nuclear Safeguards and Security			
Security Affairs	30	0	0
Fissile Materials Control & Disposition			
Fissile Materials Control & Disposition	100	0	0
TOTAL OTHER DEFENSE ACTIVITIES	256	45	45
DEPARTMENTAL ADMINISTRATION			
Human Resources & Administration			
Program Direction - HR	497	200	200
Economic Impact & Diversity			
Minority Economic Impact	0	4	0
TOTAL DEPARTMENTAL ADMINISTRATION	497	204	204
TOTAL OFFICE OF SCIENTIFIC & TECHNICAL INFORMATION	16,803	12,235	12,249

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OHIO FIELD OFFICE

	FY 1995 COMPARABLE	FY 1996 COMPARABLE	FY 1997 REQUEST
ENERGY SUPPLY RESEARCH AND DEVELOPMENT ACTIVITIES			
Nuclear Fission			
Advanced Radioisotope Power Systems.....	150	100	0
Environmental Restoration and Waste Management			
Environmental Restoration.....	16,907	11,668	3,500
Waste Management.....	124,723	115,389	123,601
TOTAL Environmental Restoration and Waste Management.....	141,630	127,057	127,101
In-House Energy Management			
In-House Energy Management.....	2,106	0	0
TOTAL ENERGY SUPPLY RESEARCH AND DEVELOPMENT ACTIVITIES.....	143,886	127,157	127,101
URANIUM SUPPLY AND ENRICHMENT ACTIVITIES			
Uranium Supply and Enrichment Activities			
Program Direction - NE.....	1	0	0
TOTAL URANIUM SUPPLY AND ENRICHMENT ACTIVITIES.....	1	0	0
WEAPONS ACTIVITIES			
Stockpile Management			
Stockpile Management.....	6,955	5,120	22,533
TOTAL WEAPONS ACTIVITIES.....	6,955	5,120	22,533
DEFENSE ENVIRONMENTAL RESTORATION & WASTE MANAGEMENT			
Environmental Restoration			
Environmental Restoration.....	13,565	17,524	25,375
Science and Technology			
Science and Technology.....	50	228	1,775
Site Operations			
Site Operations.....	123	0	100
Program Direction			
Program Direction - EM.....	22,703	29,505	28,450
TOTAL DEFENSE ENVIRONMENTAL RESTORATION & WASTE MANAGEMENT.....	36,441	47,257	55,700
OTHER DEFENSE ACTIVITIES			
Worker and Community Transition			
Worker and Community Transition.....	11,400	1,100	0
TOTAL OTHER DEFENSE ACTIVITIES.....	11,400	1,100	0
TOTAL OHIO FIELD OFFICE.....	198,683	180,634	205,334

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PACIFIC NORTHWEST LABORATORY

	FY 1995 COMPARABLE	FY 1996 COMPARABLE	FY 1997 REQUEST
ENERGY SUPPLY RESEARCH AND DEVELOPMENT ACTIVITIES			
Solar and Renewable Energy			
Biofuels.....	50	0	0
Wind Energy.....	300	0	0
Electric Energy Systems & Storage.....	1,645	1,000	700
Hydrogen Research R&D.....	147	0	0
Solar and Renewable Energy Deployment.....	0	300	100
TOTAL Solar and Renewable Energy.....	2,142	1,300	800
Nuclear Fission			
Program Direction - NE.....	2,303	0	0
Civilian Radioactive Waste R&D.....	301	0	0
Isotope Support.....	800	775	0
TOTAL Nuclear Fission.....	3,404	775	0
Environment, Safety and Health			
Environment, Safety and Health.....	9,792	9,000	7,466
Biological and Environmental Research			
Biological and Environmental Research.....	83,933	92,187	84,456
Magnetic Fusion			
Fusion Energy Research.....	2,733	1,592	1,730
Supporting Research and Technical Analysis			
Basic Energy Sciences.....	11,759	11,132	11,264
Energy Research Analyses.....	465	250	0
Computational & Technology Research.....	8,510	3,465	4,400
TOTAL Supporting Research and Technical Analysis.....	20,734	14,847	15,664
Multiprogram Facilities Support			
Multiprogram Energy Labs - Facilities Support.....	3,870	4,740	5,090
In-House Energy Management			
In-House Energy Management.....	239	0	0
University & Science Education			
University & Science Education.....	1,411	380	450
TOTAL ENERGY SUPPLY RESEARCH AND DEVELOPMENT ACTIVITIES.....	128,258	124,821	115,656
URANIUM SUPPLY AND ENRICHMENT ACTIVITIES			
Uranium Supply and Enrichment Activities			
Uranium Supply and Enrichment Activities.....	100	100	0
TOTAL URANIUM SUPPLY AND ENRICHMENT ACTIVITIES.....	100	100	0
GENERAL SCIENCE AND RESEARCH ACTIVITIES			
High Energy Physics			
High Energy Physics.....	45	45	52
TOTAL GENERAL SCIENCE AND RESEARCH ACTIVITIES.....	45	45	52
WEAPONS ACTIVITIES			
Stockpile Management			
Stockpile Management.....	0	5,330	3,000
Stockpile Stewardship			
Stockpile Stewardship.....	3,000	0	0
TOTAL WEAPONS ACTIVITIES.....	3,000	5,330	3,000
DEFENSE ENVIRONMENTAL RESTORATION & WASTE MANAGEMENT			
Science and Technology			
Science and Technology.....	22,628	20,924	9,978

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PACIFIC NORTHWEST LABORATORY

	FY 1995 COMPARABLE	FY 1996 COMPARABLE	FY 1997 REQUEST
Site Operations			
Site Operations	2,662	2,574	0
Nuclear Materials & Facilities Stabilization			
Nuclear Materials & Facilities Stabilization	25	0	0
Environmental Management Science Program			
Environmental Management Science Program	200	200	0
TOTAL DEFENSE ENVIRONMENTAL RESTORATION & WASTE MANAGEMENT	25,515	23,698	9,978
OTHER DEFENSE ACTIVITIES			
Verification and Control Technology			
Arms Control	4,355	15,230	17,260
Intelligence	5,389	5,339	5,040
Nonproliferation & Verification R&D	14,425	17,155	14,865
TOTAL Verification and Control Technology	24,169	37,724	37,165
Nuclear Safeguards and Security			
Security Affairs	2,113	1,753	1,853
Fissile Materials Control & Disposition			
Fissile Materials Control & Disposition	140	445	0
Emergency Management			
Emergency Management	200	200	200
Environment, Safety, and Health			
Environment, Safety, and Health	9,901	8,793	9,127
International Nuclear Safety			
International Nuclear Safety	55,300	27,000	61,400
Nuclear Security			
Nuclear Security	0	0	5,000
TOTAL OTHER DEFENSE ACTIVITIES	91,823	75,915	114,745
DEPARTMENTAL ADMINISTRATION			
Office of Policy			
Environmental Policy Studies	372	245	0
TOTAL DEPARTMENTAL ADMINISTRATION	372	245	0
FOSSIL ENERGY RESEARCH AND DEVELOPMENT			
Coal Research and Development			
Advanced Research and Tech. Development	1,100	985	740
Oil, Gas, and Shale Research and Development			
Fuel Cells	398	350	290
TOTAL FOSSIL ENERGY RESEARCH AND DEVELOPMENT	1,498	1,335	1,030
ENERGY CONSERVATION			
Building Technologies, State, & Community Sector			
Research & Development	11,092	6,382	11,730
Grants	47	58	0
TOTAL Building Technologies, State, & Community Sector	11,139	6,440	11,730
Industrial Technologies			
Industry Sector	4,952	855	730
Transportation Technologies			
Transportation Sector	1,562	1,925	3,332
Utility Technologies			
Utility Sector	340	0	0
Policy and Management			
Policy and Management - EE	123	1,445	1,130

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PACIFIC NORTHWEST LABORATORY	FY 1995 COMPARABLE	FY 1996 COMPARABLE	FY 1997 REQUEST
Federal Energy Management Program			
Federal Energy Management Program.....	2,682	2,600	2,700
TOTAL ENERGY CONSERVATION.....	20,798	13,265	19,622
NUCLEAR WASTE FUND			
Nuclear Waste Disposal Fund			
Nuclear Waste Fund.....	245	65	100
TOTAL NUCLEAR WASTE FUND.....	245	65	100
ENERGY INFORMATION ADMINISTRATION			
Energy Information Administration			
National Energy Information System.....	203	173	147
TOTAL ENERGY INFORMATION ADMINISTRATION.....	203	173	147
TOTAL PACIFIC NORTHWEST LABORATORY.....	271,857	244,992	264,330

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PADUCAH GASEOUS DIFFUSION PLANT	FY 1995 COMPARABLE	FY 1996 COMPARABLE	FY 1997 REQUEST
URANIUM SUPPLY AND ENRICHMENT ACTIVITIES			
Uranium Supply and Enrichment Activities			
Uranium Supply and Enrichment Activities.....	22,224	20,886	15,827
TOTAL URANIUM SUPPLY AND ENRICHMENT ACTIVITIES.....	22,224	20,886	15,827
URANIUM ENRICHMENT DECON. & DECOM. FUND			
Uranium Enrichment D & D Fund			
UE Decontamination & Decommissioning Fund.....	53,868	48,303	34,310
TOTAL URANIUM ENRICHMENT DECON. & DECOM. FUND.....	53,868	48,303	34,310
TOTAL PADUCAH GASEOUS DIFFUSION PLANT.....	76,092	69,189	50,137

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PANTEX PLANT

	FY 1995 COMPARABLE	FY 1996 COMPARABLE	FY 1997 REQUEST
ENERGY SUPPLY RESEARCH AND DEVELOPMENT ACTIVITIES			
In-House Energy Management			
In-House Energy Management.....	100	0	0
TOTAL ENERGY SUPPLY RESEARCH AND DEVELOPMENT ACTIVITIES.....	100	0	0
WEAPONS ACTIVITIES			
Program Direction			
Program Direction - DP.....	1,750	0	0
Stockpile Management			
Stockpile Management.....	252,425	281,120	264,959
Stockpile Stewardship			
Stockpile Stewardship.....	150	175	0
TOTAL WEAPONS ACTIVITIES.....	254,325	281,295	264,959
DEFENSE ENVIRONMENTAL RESTORATION & WASTE MANAGEMENT			
Environmental Restoration			
Environmental Restoration.....	20,377	12,832	9,075
Waste Management			
Waste Management.....	12,612	11,249	11,047
TOTAL DEFENSE ENVIRONMENTAL RESTORATION & WASTE MANAGEMENT.....	32,989	24,081	20,122
OTHER DEFENSE ACTIVITIES			
Verification and Control Technology			
Arms Control.....	260	575	625
Intelligence.....	120	120	100
TOTAL Verification and Control Technology.....	380	695	725
TOTAL OTHER DEFENSE ACTIVITIES.....	380	695	725
TOTAL PANTEX PLANT.....	287,794	306,071	285,806

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PINELLAS PLANT

	FY 1995 COMPARABLE	FY 1996 COMPARABLE	FY 1997 REQUEST
WEAPONS ACTIVITIES			
Stockpile Management			
Stockpile Management.....	4,595	6,680	18,267
Stockpile Stewardship			
Stockpile Stewardship.....	557	0	0
TOTAL WEAPONS ACTIVITIES.....	5,152	6,680	18,267
DEFENSE ENVIRONMENTAL RESTORATION & WASTE MANAGEMENT			
Site Operations			
Site Operations.....	43,217	52,490	59,065
TOTAL DEFENSE ENVIRONMENTAL RESTORATION & WASTE MANAGEMENT.....	43,217	52,490	59,065
TOTAL PINELLAS PLANT.....	48,369	59,170	77,332

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PITTSBURGH ENERGY TECHNOLOGY CENTER	FY 1995 COMPARABLE	FY 1996 COMPARABLE	FY 1997 REQUEST
ENERGY SUPPLY RESEARCH AND DEVELOPMENT ACTIVITIES			
Solar and Renewable Energy			
Biofuels.....	240	0	0
In-House Energy Management			
In-House Energy Management.....	50	0	0
TOTAL ENERGY SUPPLY RESEARCH AND DEVELOPMENT ACTIVITIES.....	290	0	0
DEFENSE ENVIRONMENTAL RESTORATION & WASTE MANAGEMENT			
Science and Technology			
Science and Technology.....	9.925	13.815	10.930
Program Direction			
Program Direction - EM.....	332	638	3.589
TOTAL DEFENSE ENVIRONMENTAL RESTORATION & WASTE MANAGEMENT.....	10.257	14.453	14.519
OTHER DEFENSE ACTIVITIES			
Worker and Community Transition			
Worker and Community Transition.....	250	225	0
TOTAL OTHER DEFENSE ACTIVITIES.....	250	225	0
OFFICE OF THE INSPECTOR GENERAL			
Office of the Inspector General			
Office of Inspector General.....	1.176	915	1.050
TOTAL OFFICE OF THE INSPECTOR GENERAL.....	1.176	915	1.050
FOSSIL ENERGY RESEARCH AND DEVELOPMENT			
Coal Research and Development			
Advanced Research and Tech. Development.....	5.260	3.747	3.063
Advanced Clean Fuels Research.....	29.271	18.281	14.574
Advanced Clean/Efficient Power Systems.....	21.304	20.631	16.746
TOTAL Coal Research and Development.....	56.835	42.659	34.383
Oil, Gas, and Shale Research and Development			
Natural Gas Research.....	5.764	2.801	2.955
Oil Technology.....	852	335	490
TOTAL Oil, Gas, and Shale Research and Development.....	6.616	3.136	3.445
Program Direction and Management Support			
Energy Technology Center Program Direction.....	26.904	25.257	17.451
Cooperative R&D Ventures			
Cooperative R&D.....	497	0	0
Plant & Capital Equipment			
Plant - FE.....	1.794	0	0
Capital Equipment - FE.....	222	0	0
TOTAL Plant & Capital Equipment.....	2.016	0	0
Mining			
Mining.....	0	40.000	5.000
TOTAL FOSSIL ENERGY RESEARCH AND DEVELOPMENT.....	91.868	111.052	60.279
ENERGY CONSERVATION			
Transportation Technologies			
Transportation Sector.....	600	0	0
TOTAL ENERGY CONSERVATION.....	600	0	0
TOTAL PITTSBURGH ENERGY TECHNOLOGY CENTER.....	104.441	126.645	75.848

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PITTSBURGH NAVAL REACTORS	FY 1995 COMPARABLE	FY 1996 COMPARABLE	FY 1997 REQUEST
DEFENSE ENVIRONMENTAL RESTORATION & WASTE MANAGEMENT			
Site Operations			
Site Operations.....	160	75	0
TOTAL DEFENSE ENVIRONMENTAL RESTORATION & WASTE MANAGEMENT.....	160	75	0
OTHER DEFENSE ACTIVITIES			
Security Investigations			
Security Investigations.....	2.292	0	1.100
Naval Reactors			
Naval Reactors Development.....	58	1.718	430
Program Direction - NE.....	6.089	3.832	5.170
TOTAL Naval Reactors.....	6.147	5.550	5.600
TOTAL OTHER DEFENSE ACTIVITIES.....	8.439	5.550	6.700
TOTAL PITTSBURGH NAVAL REACTORS.....	8.599	5.625	6.700

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PORTSMOUTH GASEOUS DIFFUSION PLANT	FY 1995 COMPARABLE	FY 1996 COMPARABLE	FY 1997 REQUEST
URANIUM SUPPLY AND ENRICHMENT ACTIVITIES			
Uranium Supply and Enrichment Activities			
Uranium Supply and Enrichment Activities.....	28.551	20.363	17.510
TOTAL URANIUM SUPPLY AND ENRICHMENT ACTIVITIES.....	28.551	20.363	17.510
URANIUM ENRICHMENT DECON. & DECOM. FUND			
Uranium Enrichment D & D Fund			
UE Decontamination & Decommissioning Fund.....	68.043	58.955	60.837
TOTAL URANIUM ENRICHMENT DECON. & DECOM. FUND.....	68.043	58.955	60.837
TOTAL PORTSMOUTH GASEOUS DIFFUSION PLANT.....	96.594	79.318	78.347

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PRINCETON PLASMA PHYSICS LABORATORY	FY 1995 COMPARABLE	FY 1996 COMPARABLE	FY 1997 REQUEST
ENERGY SUPPLY RESEARCH AND DEVELOPMENT ACTIVITIES			
Environmental Restoration and Waste Management			
Waste Management.....	7,918	2,371	5,925
Biological and Environmental Research			
Biological and Environmental Research.....	1,652	1,476	1,450
Magnetic Fusion			
Fusion Energy Research.....	118,726	60,431	67,810
Supporting Research and Technical Analysis			
Computational & Technology Research.....	425	0	0
In-House Energy Management			
In-House Energy Management.....	453	0	0
University & Science Education			
University & Science Education.....	381	300	300
TOTAL ENERGY SUPPLY RESEARCH AND DEVELOPMENT ACTIVITIES.....	129,555	64,578	75,485
OFFICE OF THE INSPECTOR GENERAL			
Office of the Inspector General			
Office of Inspector General.....	723	457	526
TOTAL OFFICE OF THE INSPECTOR GENERAL.....	723	457	526
TOTAL PRINCETON PLASMA PHYSICS LABORATORY.....	130,278	65,035	76,011

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RICHLAND OPERATIONS OFFICE	FY 1995 COMPARABLE	FY 1996 COMPARABLE	FY 1997 REQUEST
ENERGY SUPPLY RESEARCH AND DEVELOPMENT ACTIVITIES			
Nuclear Fission			
Program Direction - NE	550	512	442
Environmental Restoration and Waste Management			
Waste Management	18,178	11,550	11,506
Biological and Environmental Research			
Biological and Environmental Research	7,409	5,554	4,835
Magnetic Fusion			
Fusion Energy Research	1,361	515	660
Supporting Research and Technical Analysis			
Basic Energy Sciences	3,100	2,647	2,571
Computational & Technology Research	1,184	551	65
TOTAL Supporting Research and Technical Analysis	4,284	3,198	2,636
University & Science Education			
University & Science Education	756	0	0
TOTAL ENERGY SUPPLY RESEARCH AND DEVELOPMENT ACTIVITIES	32,538	21,329	20,079
URANIUM SUPPLY AND ENRICHMENT ACTIVITIES			
Uranium Supply and Enrichment Activities			
Uranium Supply and Enrichment Activities	0	470	0
TOTAL URANIUM SUPPLY AND ENRICHMENT ACTIVITIES	0	470	0
GENERAL SCIENCE AND RESEARCH ACTIVITIES			
High Energy Physics			
High Energy Physics	1,351	750	1,208
Nuclear Physics			
Nuclear Physics	8,368	5,076	5,994
TOTAL GENERAL SCIENCE AND RESEARCH ACTIVITIES	9,719	5,826	7,202
WEAPONS ACTIVITIES			
Program Direction			
Program Direction - DP	3,616	1,480	1,735
Stockpile Management			
Stockpile Management	21,631	21,054	20,899
TOTAL WEAPONS ACTIVITIES	25,247	22,534	22,634
DEFENSE ENVIRONMENTAL RESTORATION & WASTE MANAGEMENT			
Environmental Restoration			
Environmental Restoration	177,081	157,433	130,799
Waste Management			
Waste Management	839,910	678,332	465,027
Science and Technology			
Science and Technology	4,466	2,632	26,405
Site Operations			
Site Operations	25,110	25,494	19,966
Program Direction			
Program Direction - EM	92,358	83,203	72,963
Nuclear Materials & Facilities Stabilization			
Nuclear Materials & Facilities Stabilization	-75	1,700	0
Policy and Management			
Policy and Management	913	5,170	6,500
Environmental Management Privatization			
Environmental Management Privatization	0	0	185,000
TOTAL DEFENSE ENVIRONMENTAL RESTORATION & WASTE MANAGEMENT	1,139,763	953,964	906,660

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RICHLAND OPERATIONS OFFICE	FY 1995 COMPARABLE	FY 1996 COMPARABLE	FY 1997 REQUEST
OTHER DEFENSE ACTIVITIES			
Security Investigations			
Security Investigations	997	880	800
Worker and Community Transition			
Worker and Community Transition	145	90	0
Fissile Materials Control & Disposition			
Fissile Materials Control & Disposition	0	25	0
TOTAL OTHER DEFENSE ACTIVITIES	1,142	995	800
DEPARTMENTAL ADMINISTRATION			
Cost of Work for Others			
Cost of Work for Others	32	532	0
Human Resources & Administration			
Program Direction - HR	78	0	0
TOTAL DEPARTMENTAL ADMINISTRATION	110	532	0
OFFICE OF THE INSPECTOR GENERAL			
Office of the Inspector General			
Office of Inspector General	1,085	993	963
TOTAL OFFICE OF THE INSPECTOR GENERAL	1,085	993	963
NUCLEAR WASTE FUND			
Nuclear Waste Disposal Fund			
Nuclear Waste Fund	78	0	0
Program Direction - RW	84	85	87
TOTAL Nuclear Waste Disposal Fund	162	85	87
TOTAL NUCLEAR WASTE FUND	162	85	87
TOTAL RICHLAND OPERATIONS OFFICE	1,209,766	1,006,728	958,425

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RICHLAND PRODUCTION FACILITIES	FY 1995 COMPARABLE	FY 1996 COMPARABLE	FY 1997 REQUEST
ENERGY SUPPLY RESEARCH AND DEVELOPMENT ACTIVITIES			
In-House Energy Management			
In-House Energy Management.....	200	0	0
	-----	-----	-----
TOTAL ENERGY SUPPLY RESEARCH AND DEVELOPMENT ACTIVITIES.....	200	0	0
	-----	-----	-----
TOTAL RICHLAND PRODUCTION FACILITIES.....	200	0	0
	=====	=====	=====

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ROCKY FLATS OFFICE

	FY 1995 COMPARABLE	FY 1996 COMPARABLE	FY 1997 REQUEST
WEAPONS ACTIVITIES			
Stockpile Management			
Stockpile Management.....	51,590	46,000	48,000
Stockpile Stewardship			
Stockpile Stewardship.....	790	524	0
TOTAL WEAPONS ACTIVITIES.....	52,380	46,524	48,000
DEFENSE ENVIRONMENTAL RESTORATION & WASTE MANAGEMENT			
Site Operations			
Site Operations.....	1,886	268	1,543
TOTAL DEFENSE ENVIRONMENTAL RESTORATION & WASTE MANAGEMENT.....	1,886	268	1,543
OTHER DEFENSE ACTIVITIES			
Security Investigations			
Security Investigations.....	1,200	316	900
Worker and Community Transition			
Worker and Community Transition.....	23,900	5,100	0
Fissile Materials Control & Disposition			
Fissile Materials Control & Disposition.....	0	25	0
TOTAL OTHER DEFENSE ACTIVITIES.....	25,100	5,441	900
TOTAL ROCKY FLATS OFFICE.....	79,366	52,233	50,443

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ROCKY FLATS ENVIRONMENTAL TECHNOLOGY SITE	FY 1995 COMPARABLE	FY 1996 COMPARABLE	FY 1997 REQUEST
DEFENSE ENVIRONMENTAL RESTORATION & WASTE MANAGEMENT			
Environmental Restoration			
Environmental Restoration.....	566,581	532,864	504,322
Science and Technology			
Science and Technology.....	5,416	2,495	1,539
Program Direction			
Program Direction - EM.....	30,890	48,828	44,243
TOTAL DEFENSE ENVIRONMENTAL RESTORATION & WASTE MANAGEMENT.....	602,887	584,187	550,104
OTHER DEFENSE ACTIVITIES			
Fissile Materials Control & Disposition			
Fissile Materials Control & Disposition.....	0	30	0
TOTAL OTHER DEFENSE ACTIVITIES.....	0	30	0
TOTAL ROCKY FLATS ENVIRONMENTAL TECHNOLOGY SITE.....	602,887	584,217	550,104

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SANDIA NATIONAL LABORATORIES

	FY 1995- COMPARABLE	FY 1996 COMPARABLE	FY 1997 REQUEST
ENERGY SUPPLY RESEARCH AND DEVELOPMENT ACTIVITIES			
Solar and Renewable Energy			
Photovoltaic Systems R&D.....	12,000	8,000	10,000
Solar Thermal R&D.....	17,042	12,818	14,570
Biofuels.....	500	401	400
Wind Energy.....	3,180	3,150	3,150
Resource Assessment.....	34	0	0
Geothermal Energy R&D.....	7,266	3,800	4,900
Electric Energy Systems & Storage.....	4,063	2,465	4,850
Hydrogen Research R&D.....	1,500	1,900	1,168
Solar and Renewable Energy Deployment.....	0	100	100
TOTAL Solar and Renewable Energy.....	45,585	32,634	39,138
Nuclear Fission			
Light Water Reactors.....	4,753	5,000	5,500
Space Reactor Power Systems.....	20	0	0
Advanced Radioisotope Power Systems.....	0	281	0
Isotope Support.....	7,600	12,000	0
TOTAL Nuclear Fission.....	12,373	17,281	5,500
Environment, Safety and Health			
Environment, Safety and Health.....	247	217	198
Biological and Environmental Research			
Biological and Environmental Research.....	1,335	1,342	1,318
Magnetic Fusion			
Fusion Energy Research.....	8,208	5,723	5,560
Supporting Research and Technical Analysis			
Basic Energy Sciences.....	20,023	20,905	28,021
Computational & Technology Research.....	4,918	4,725	4,269
TOTAL Supporting Research and Technical Analysis.....	24,941	25,630	32,290
In-House Energy Management			
In-House Energy Management.....	1,570	0	0
University & Science Education			
University & Science Education.....	1,487	1,275	1,300
TOTAL ENERGY SUPPLY RESEARCH AND DEVELOPMENT ACTIVITIES.....	95,746	84,102	85,304
URANIUM SUPPLY AND ENRICHMENT ACTIVITIES			
Uranium Supply and Enrichment Activities			
Uranium Supply and Enrichment Activities.....	657	50	0
TOTAL URANIUM SUPPLY AND ENRICHMENT ACTIVITIES.....	657	50	0
WEAPONS ACTIVITIES			
Program Direction			
Program Direction - DP.....	1,940	900	960
Stockpile Management			
Stockpile Management.....	198,543	204,398	189,220
Stockpile Stewardship			
Stockpile Stewardship.....	453,660	433,662	395,337*
TOTAL WEAPONS ACTIVITIES.....	654,143	638,960	585,517
DEFENSE ENVIRONMENTAL RESTORATION & WASTE MANAGEMENT			
Environmental Restoration			
Environmental Restoration.....	30,867	28,019	17,534
Waste Management			
Waste Management.....	7,460	17,898	14,886

* The FY 1997 requests for the National Ignition Facility (NIF) and Accelerated Strategic Computing Initiative (ASCI) are currently included in the estimate for Washington headquarters, pending final site selection.

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SANDIA NATIONAL LABORATORIES	FY 1995 COMPARABLE	FY 1996 COMPARABLE	FY 1997 REQUEST
Science and Technology			
Science and Technology	19,368	19,500	9,462
Site Operations			
Site Operations	8,481	5,500	5,045
Environmental Management Science Program			
Environmental Management Science Program	600	200	0
TOTAL DEFENSE ENVIRONMENTAL RESTORATION & WASTE MANAGEMENT	66,776	71,117	46,927
OTHER DEFENSE ACTIVITIES			
Verification and Control Technology			
Arms Control	11,854	25,905	35,145
Intelligence	2,859	2,823	2,665
Nonproliferation & Verification R&D	69,870	68,872	65,210
TOTAL Verification and Control Technology	84,583	97,600	103,020
Nuclear Safeguards and Security			
Security Affairs	8,706	6,981	7,927
Fissile Materials Control & Disposition			
Fissile Materials Control & Disposition	4,950	3,770	3,800
Emergency Management			
Emergency Management	400	200	200
Environment, Safety, and Health			
Environment, Safety, and Health	65	65	65
TOTAL OTHER DEFENSE ACTIVITIES	98,704	108,616	115,012
DEPARTMENTAL ADMINISTRATION			
Economic Impact & Diversity			
Minority Economic Impact	100	50	50
TOTAL DEPARTMENTAL ADMINISTRATION	100	50	50
FOSSIL ENERGY RESEARCH AND DEVELOPMENT			
Coal Research and Development			
Advanced Research and Tech. Development	565	825	700
Advanced Clean Fuels Research	1,652	1,150	1,210
TOTAL Coal Research and Development	2,217	1,975	1,910
Oil, Gas, and Shale Research and Development			
Natural Gas Research	900	323	453
Oil Technology	6,100	5,100	7,886
TOTAL Oil, Gas, and Shale Research and Development	7,000	5,423	8,339
TOTAL FOSSIL ENERGY RESEARCH AND DEVELOPMENT	9,217	7,398	10,249
ENERGY CONSERVATION			
Industrial Technologies			
Industry Sector	4,716	4,777	2,360
Transportation Technologies			
Transportation Sector	2,420	2,830	5,739
Federal Energy Management Program			
Federal Energy Management Program	85	130	150
TOTAL ENERGY CONSERVATION	7,221	7,737	8,249
NUCLEAR WASTE FUND			
Nuclear Waste Disposal Fund			
Nuclear Waste Fund	17,053	6,624	9,176
TOTAL NUCLEAR WASTE FUND	17,053	6,624	9,176

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SANDIA NATIONAL LABORATORIES	FY 1995 COMPARABLE	FY 1996 COMPARABLE	FY 1997 REQUEST
DEFENSE NUCLEAR WASTE DISPOSAL			
Defense Nuclear Waste Disposal			
Defense Nuclear Waste Disposal.....	3,721	4,474	5,476
TOTAL DEFENSE NUCLEAR WASTE DISPOSAL.....	3,721	4,474	5,476
STRATEGIC PETROLEUM RESERVE			
SPR - Facilities Development			
SPR - Facilities Development.....	3,010	2,506	2,961
TOTAL STRATEGIC PETROLEUM RESERVE.....	3,010	2,506	2,961
TOTAL SANDIA NATIONAL LABORATORIES.....	956,348	931,634	868,921

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SAVANNAH RIVER ECOLOGY LABORATORY	FY 1995 COMPARABLE	FY 1996 COMPARABLE	FY 1997 REQUEST
ENERGY SUPPLY RESEARCH AND DEVELOPMENT ACTIVITIES			
University & Science Education			
University & Science Education.....	149	100	100
TOTAL ENERGY SUPPLY RESEARCH AND DEVELOPMENT ACTIVITIES.....	149	100	100
TOTAL SAVANNAH RIVER ECOLOGY LABORATORY.....	149	100	100

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SAVANNAH RIVER OPERATIONS OFFICE

	FY 1995 COMPARABLE	FY 1996 COMPARABLE	FY 1997 REQUEST
ENERGY SUPPLY RESEARCH AND DEVELOPMENT ACTIVITIES			
Supporting Research and Technical Analysis			
Basic Energy Sciences	103	0	75
University & Science Education			
University & Science Education	52	0	0
TOTAL ENERGY SUPPLY RESEARCH AND DEVELOPMENT ACTIVITIES	155	0	75
WEAPONS ACTIVITIES			
Program Direction			
Program Direction - DP	4,325	2,865	2,855
Stockpile Management			
Stockpile Management	3,083	4,135	4,150
TOTAL WEAPONS ACTIVITIES	7,408	7,000	7,005
DEFENSE ENVIRONMENTAL RESTORATION & WASTE MANAGEMENT			
Waste Management			
Waste Management	614,932	532,156	485,380
Science and Technology			
Science and Technology	6,610	5,591	9,440
Site Operations			
Site Operations	135,727	88,333	54,309
Program Direction			
Program Direction - EM	79,051	75,520	66,531
Policy and Management			
Policy and Management	0	625	800
TOTAL DEFENSE ENVIRONMENTAL RESTORATION & WASTE MANAGEMENT	836,320	702,225	616,460
OTHER DEFENSE ACTIVITIES			
Verification and Control Technology			
Arms Control	243	680	625
Security Investigations			
Security Investigations	3,050	2,507	2,000
Worker and Community Transition			
Worker and Community Transition	31,847	0	0
Fissile Materials Control & Disposition			
Fissile Materials Control & Disposition	15	25	0
TOTAL OTHER DEFENSE ACTIVITIES	35,155	3,212	2,625
DEPARTMENTAL ADMINISTRATION			
Cost of Work for Others			
Cost of Work for Others	3,500	3,000	3,000
TOTAL DEPARTMENTAL ADMINISTRATION	3,500	3,000	3,000
OFFICE OF THE INSPECTOR GENERAL			
Office of the Inspector General			
Office of Inspector General	1,627	1,372	1,489
TOTAL OFFICE OF THE INSPECTOR GENERAL	1,627	1,372	1,489
TOTAL SAVANNAH RIVER OPERATIONS OFFICE	884,165	716,809	630,654

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SAVANNAH RIVER SITE

	FY 1995 COMPARABLE	FY 1996 COMPARABLE	FY 1997 REQUEST
ENERGY SUPPLY RESEARCH AND DEVELOPMENT ACTIVITIES			
Nuclear Fission			
Advanced Radioisotope Power Systems	13,980	9,860	700
Environmental Restoration and Waste Management			
Environmental Restoration	292	4,300	4,300
Magnetic Fusion			
Fusion Energy Research	378	282	400
In-House Energy Management			
In-House Energy Management	143	0	0
TOTAL ENERGY SUPPLY RESEARCH AND DEVELOPMENT ACTIVITIES	14,793	14,442	5,400
WEAPONS ACTIVITIES			
Stockpile Management			
Stockpile Management	120,618	149,250	98,470
Stockpile Stewardship			
Stockpile Stewardship	1,576	1,358	780
TOTAL WEAPONS ACTIVITIES	122,194	150,608	99,250
DEFENSE ENVIRONMENTAL RESTORATION & WASTE MANAGEMENT			
Environmental Restoration			
Environmental Restoration	110,169	99,818	107,457
Science and Technology			
Science and Technology	11,096	23,797	17,135
Nuclear Materials & Facilities Stabilization			
Nuclear Materials & Facilities Stabilization	588,489	462,145	433,569
TOTAL DEFENSE ENVIRONMENTAL RESTORATION & WASTE MANAGEMENT	709,754	585,760	558,161
OTHER DEFENSE ACTIVITIES			
Fissile Materials Control & Disposition			
Fissile Materials Control & Disposition	1,540	1,510	0
TOTAL OTHER DEFENSE ACTIVITIES	1,540	1,510	0
TOTAL SAVANNAH RIVER SITE	848,281	752,320	662,811

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SAVANNAH RIVER TECHNOLOGY CENTER	FY 1995 COMPARABLE	FY 1996 COMPARABLE	FY 1997 REQUEST
ENERGY SUPPLY RESEARCH AND DEVELOPMENT ACTIVITIES			
Environment, Safety and Health			
Environment, Safety and Health.....	191	173	161
Biological and Environmental Research			
Biological and Environmental Research.....	148	148	0
Magnetic Fusion			
Fusion Energy Research.....	378	282	400
University & Science Education			
University & Science Education.....	95	5	0
TOTAL ENERGY SUPPLY RESEARCH AND DEVELOPMENT ACTIVITIES.....	812	608	561
OTHER DEFENSE ACTIVITIES			
Verification and Control Technology			
Intelligence.....	555	500	470
Nonproliferation & Verification R&D.....	2,265	3,062	1,550
TOTAL Verification and Control Technology.....	2,820	3,562	2,020
TOTAL OTHER DEFENSE ACTIVITIES.....	2,820	3,562	2,020
TOTAL SAVANNAH RIVER TECHNOLOGY CENTER.....	3,632	4,170	2,581

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SCHEENECTADY NAVAL REACTORS	FY 1995 COMPARABLE	FY 1996 COMPARABLE	FY 1997 REQUEST
OTHER DEFENSE ACTIVITIES			
Security Investigations			
Security Investigations	724	712	500
Naval Reactors			
Program Direction - NE	4,600	4,700	4,700
TOTAL OTHER DEFENSE ACTIVITIES	5,324	5,412	5,200
TOTAL SCHEENECTADY NAVAL REACTORS	5,324	5,412	5,200

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SOUTHEASTERN POWER ADMINISTRATION	FY 1995 COMPARABLE	FY 1996 COMPARABLE	FY 1997 REQUEST
SOUTHEASTERN POWER ADMIN. - OPERATION & MAINTENANCE			
Purchase Power and Wheeling			
Purchase Power and Wheeling.....	27.249	26.430	23.456
Program Direction			
Program Direction - SE.....	3.284	3.472	3.989
TOTAL SOUTHEASTERN POWER ADMIN. - OPERATION & MAINTENANCE.....	30.533	29.902	27.445
SOUTHEASTERN POWER ADMINISTRATION - CONTINUING FUND			
Continuing Fund			
SEPA - Continuing Fund.....	50	50	50
TOTAL SOUTHEASTERN POWER ADMINISTRATION - CONTINUING FUND.....	50	50	50
TOTAL SOUTHEASTERN POWER ADMINISTRATION.....	30.583	29.952	27.495

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SOUTHWESTERN POWER ADMINISTRATION	FY 1995 COMPARABLE	FY 1996 COMPARABLE	FY 1997 REQUEST
SOUTHWESTERN POWER ADMIN. - OPERATION & MAINTENANCE			
Systems Operation and Maintenance			
SWPA - Operation and Maintenance.....	12.061	11.378	8.847
Purchase Power and Wheeling			
Purchase Power and Wheeling.....	1.503	1.630	1.095
Program Direction			
Program Direction - SW.....	16.984	17.740	17.862
TOTAL SOUTHWESTERN POWER ADMIN. - OPERATION & MAINTENANCE.....	30.548	30.748	27.804
SOUTHWESTERN POWER ADMINISTRATION - CONTINUING FUND			
Continuing Fund			
SWPA - Continuing Fund.....	300	300	300
TOTAL SOUTHWESTERN POWER ADMINISTRATION - CONTINUING FUND.....	300	300	300
TOTAL SOUTHWESTERN POWER ADMINISTRATION.....	30.848	31.048	28.104

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SPECIFIC MANUFACTURING CAPABILITY FACILITY	FY 1995 COMPARABLE	FY 1996 COMPARABLE	FY 1997 REQUEST
DEPARTMENTAL ADMINISTRATION			
Cost of Work for Others			
Cost of Work for Others.....	1.255	281	281
TOTAL DEPARTMENTAL ADMINISTRATION.....	1.255	281	281
TOTAL SPECIFIC MANUFACTURING CAPABILITY FACILITY.....	1.255	281	281

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STANFORD LINEAR ACCELERATOR CENTER

	FY 1995 COMPARABLE	FY 1996 COMPARABLE	FY 1997 REQUEST
ENERGY SUPPLY RESEARCH AND DEVELOPMENT ACTIVITIES			
Environmental Restoration and Waste Management			
Environmental Restoration.....	945	742	995
Waste Management.....	4,370	3,021	3,602
Site Operations.....	300	215	196
TOTAL Environmental Restoration and Waste Management.....	5,615	3,978	4,793
Biological and Environmental Research			
Biological and Environmental Research.....	3,429	2,150	1,407
Magnetic Fusion			
Fusion Energy Research.....	50	50	50
Supporting Research and Technical Analysis			
Basic Energy Sciences.....	16,095	21,459	20,996
Computational & Technology Research.....	353	0	0
TOTAL Supporting Research and Technical Analysis.....	16,448	21,459	20,996
In-House Energy Management			
In-House Energy Management.....	2,124	0	0
University & Science Education			
University & Science Education.....	183	80	100
TOTAL ENERGY SUPPLY RESEARCH AND DEVELOPMENT ACTIVITIES.....	27,849	27,717	27,345
GENERAL SCIENCE AND RESEARCH ACTIVITIES			
High Energy Physics			
High Energy Physics.....	162,663	174,070	173,450
TOTAL GENERAL SCIENCE AND RESEARCH ACTIVITIES.....	162,663	174,070	173,450
TOTAL STANFORD LINEAR ACCELERATOR CENTER.....	190,512	201,787	200,796

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	FY 1995 COMPARABLE	FY 1996 COMPARABLE	FY 1997 REQUEST
STRATEGIC PETROLEUM RESERVE - BAYOU CHOCTOW			
STRATEGIC PETROLEUM RESERVE			
SPR - Facilities Development			
SPR - Facilities Development.....	10.412	12.078	17.952
TOTAL STRATEGIC PETROLEUM RESERVE.....	10.412	12.078	17.952
TOTAL STRATEGIC PETROLEUM RESERVE - BAYOU CHOCTOW.....	10.412	12.078	17.952

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	FY 1995 COMPARABLE	FY 1996 COMPARABLE	FY 1997 REQUEST
STRATEGIC PETROLEUM RESERVE - BIG HILL			
STRATEGIC PETROLEUM RESERVE			
SPR - Facilities Development			
SPR - Facilities Development.....	17.628	24.756	21.683
TOTAL STRATEGIC PETROLEUM RESERVE.....	17.628	24.756	21.683
TOTAL STRATEGIC PETROLEUM RESERVE - BIG HILL.....	17.628	24.756	21.683

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STRATEGIC PETROLEUM RESERVE - BRYAN MOUND	FY 1995 COMPARABLE	FY 1996 COMPARABLE	FY 1997 REQUEST
STRATEGIC PETROLEUM RESERVE			
SPR - Facilities Development			
SPR - Facilities Development.....	42.733	34.871	55.439
TOTAL STRATEGIC PETROLEUM RESERVE.....	42.733	34.871	55.439
TOTAL STRATEGIC PETROLEUM RESERVE - BRYAN MOUND.....	42.733	34.871	55.439

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STRATEGIC PETROLEUM RESERVE - ST. JAMES TERMINAL	FY 1995 COMPARABLE	FY 1996 COMPARABLE	FY 1997 REQUEST
STRATEGIC PETROLEUM RESERVE			
SPR - Facilities Development			
SPR - Facilities Development.....	7.657	6.604	6.212
TOTAL STRATEGIC PETROLEUM RESERVE.....	7.657	6.604	6.212
TOTAL STRATEGIC PETROLEUM RESERVE - ST. JAMES TERMINAL.....	7.657	6.604	6.212

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STRATEGIC PETROLEUM RESERVE - WEEKS ISLAND	FY 1995 COMPARABLE	FY 1996 COMPARABLE	FY 1997 REQUEST
STRATEGIC PETROLEUM RESERVE			
SPR - Facilities Development			
SPR - Facilities Development.....	15.904	0	13.931
TOTAL STRATEGIC PETROLEUM RESERVE.....	15.904	0	13.931
STRATEGIC PETROLEUM RESERVE - DECOMMISSIONING FUND			
SPR - Decommissioning Fund			
SPR - Decommissioning Fund.....	0	36.226	0
TOTAL STRATEGIC PETROLEUM RESERVE - DECOMMISSIONING FUND.....	0	36.226	0
TOTAL STRATEGIC PETROLEUM RESERVE - WEEKS ISLAND.....	15.904	36.226	13.931

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STRATEGIC PETROLEUM RESERVE - WEST HACKBERRY	FY 1995 COMPARABLE	FY 1996 COMPARABLE	FY 1997 REQUEST
STRATEGIC PETROLEUM RESERVE			
SPR - Facilities Development			
SPR - Facilities Development.....	53.103	24.661	22.587
TOTAL STRATEGIC PETROLEUM RESERVE.....	53.103	24.661	22.587
TOTAL STRATEGIC PETROLEUM RESERVE - WEST HACKBERRY.....	53.103	24.661	22.587

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STRATEGIC PETROLEUM RESERVE PROJECT OFFICE	FY 1995 COMPARABLE	FY 1996 COMPARABLE	FY 1997 REQUEST
OFFICE OF THE INSPECTOR GENERAL			
Office of the Inspector General			
Office of Inspector General.....	635	457	526
TOTAL OFFICE OF THE INSPECTOR GENERAL.....	635	457	526
STRATEGIC PETROLEUM RESERVE			
SPR - Facilities Development			
SPR - Facilities Development.....	87,132	75,045	74,501
TOTAL STRATEGIC PETROLEUM RESERVE.....	87,132	75,045	74,501
STRATEGIC PETROLEUM RESERVE - PETROLEUM ACCOUNT			
SPR - Petroleum Account			
SPR - Petroleum Account.....	4,500	4,500	4,500
TOTAL STRATEGIC PETROLEUM RESERVE - PETROLEUM ACCOUNT.....	4,500	4,500	4,500
STRATEGIC PETROLEUM RESERVE - DECOMMISSIONING FUND			
SPR - Decommissioning Fund			
SPR - Decommissioning Fund.....	0	63,774	0
TOTAL STRATEGIC PETROLEUM RESERVE - DECOMMISSIONING FUND.....	0	63,774	0
TOTAL STRATEGIC PETROLEUM RESERVE PROJECT OFFICE.....	92,267	143,776	79,527

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SUPERCONDUCTING SUPER COLLIDER LABORATORY	FY 1995 COMPARABLE	FY 1996 COMPARABLE	FY 1997 REQUEST
OFFICE OF THE INSPECTOR GENERAL			
Office of the Inspector General			
Office of Inspector General.....	180	0	0
TOTAL OFFICE OF THE INSPECTOR GENERAL.....	180	0	0
TOTAL SUPERCONDUCTING SUPER COLLIDER LABORATORY.....	180	0	0

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ENERGY SUPPLY RESEARCH AND DEVELOPMENT ACTIVITIES

Solar and Renewable Energy

	FY 1995 COMPARABLE	FY 1996 COMPARABLE	FY 1997 REQUEST
Solar Building Appliances R&D.....	1,456	1,067	3,100
Photovoltaic Systems R&D.....	4,385	5,759	6,248
Solar Thermal R&D.....	1,692	2,851	2,480
Biofuels.....	1,609	7,232	7,932
Wind Energy.....	2,972	3,209	5,850
Resource Assessment.....	527	252	0
Program Direction - EE.....	14,598	10,985	14,471
Geothermal Energy R&D.....	5,806	7,462	7,550
Electric Energy Systems & Storage.....	11,409	11,047	8,890
Hydrogen Research R&D.....	915	1,041	500
Renewable Energy Production Incentive Program.....	2,789	0	0
Solar and Renewable Energy Deployment.....	22,980	4,531	5,059

TOTAL Solar and Renewable Energy.....	71,138	55,436	62,080
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Nuclear Fission

Light Water Reactors.....	1,483	2,487	3,700
Advanced Reactor R&D.....	488	0	0
Space Reactor Power Systems.....	384	0	0
Advanced Radioisotope Power Systems.....	6,052	6,751	8,925
Facilities.....	43	0	0
Program Direction - NE.....	19,600	11,431	15,104
Termination Costs.....	412	2,891	2,150
Test Reactor Area Lendlord.....	10	0	200
Advanced Test Reactor Fusion Irradiation.....	600	1,450	50
Isotope Support.....	2,416	4,883	4,454
University Reactor Fuel Assistance and Support.....	1,161	1,300	4,750
Program Direction - RW.....	110	0	0

TOTAL Nuclear Fission.....	32,759	31,193	39,333
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Environment, Safety and Health

Environment, Safety and Health.....	24,967	31,287	24,954
Program Direction - EH.....	45,113	39,315	39,046

TOTAL Environment, Safety and Health.....	70,080	70,602	64,000
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Environmental Restoration and Waste Management

Environmental Restoration.....	34,589	9,449	8,511
Waste Management.....	4,288	0	0

TOTAL Environmental Restoration and Waste Management.....	38,877	9,449	8,511
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Biological and Environmental Research

Biological and Environmental Research.....	7,142	61,186	72,917
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Magnetic Fusion

Fusion Energy Research.....	934	9,681	31,661
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Supporting Research and Technical Analysis

Basic Energy Sciences.....	8,959	70,305	69,763
Advanced Neutron Source.....	149	0	0
Energy Research Analyses.....	493	2,520	2,000
Computational & Technology Research.....	3,964	23,543	40,117

TOTAL Supporting Research and Technical Analysis.....	13,565	96,368	111,880
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Multiprogram Facilities Support

Multiprogram Energy Labs - Facilities Support.....	17	1,071	370
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Small Business Innovation Research

Small Business Innovation Research.....	72,439	0	0
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In-House Energy Management			
In-House Energy Management.....	736	342	4,700
Program Direction - ER.....			
Program Direction - ER.....	43,253	37,045	36,521
University & Science Education.....			
University & Science Education.....	708	2,455	4,700
Technology Partnerships.....			
Technology Partnerships.....	2,902	0	0
Informations Systems Investment.....			
Informations Systems Investment.....	0	0	14,900
Field Offices and Management Adjustment.....	14,046	8,316	12,802
TOTAL ENERGY SUPPLY RESEARCH AND DEVELOPMENT ACTIVITIES.....	368,596	383,144	464,375
URANIUM SUPPLY AND ENRICHMENT ACTIVITIES			
Uranium Supply and Enrichment Activities.....			
Uranium Supply and Enrichment Activities.....	174	621	2,142
Program Direction - NE.....	1,681	1,758	2,128
TOTAL Uranium Supply and Enrichment Activities.....	1,855	2,379	4,270
TOTAL URANIUM SUPPLY AND ENRICHMENT ACTIVITIES.....	1,855	2,379	4,270
URANIUM ENRICHMENT DECON. & DECOM. FUND			
Uranium Enrichment D & D Fund.....			
UE Decontamination & Decommissioning Fund.....	41,700	42,000	42,000
TOTAL URANIUM ENRICHMENT DECON. & DECOM. FUND.....	41,700	42,000	42,000
GENERAL SCIENCE AND RESEARCH ACTIVITIES			
High Energy Physics.....			
High Energy Physics.....	9	19,896	35,391
Nuclear Physics.....			
Nuclear Physics.....	50	11,884	14,568
General Science Program Direction.....			
General Science Program Direction.....	7,707	7,286	8,151
TOTAL GENERAL SCIENCE AND RESEARCH ACTIVITIES.....	7,766	39,066	58,110
WEAPONS ACTIVITIES			
Program Direction.....			
Program Direction - DP.....	87,365	78,053	85,540
Stockpile Management.....			
Stockpile Management.....	-8,501	7,520	14,937
Stockpile Stewardship.....			
Stockpile Stewardship.....	7,135	37,132	273,212
TOTAL WEAPONS ACTIVITIES.....	85,999	122,705	373,689
DEFENSE ENVIRONMENTAL RESTORATION & WASTE MANAGEMENT			
Environmental Restoration.....			
Environmental Restoration.....	183,101	370,228	385,455
Waste Management.....			
Waste Management.....	43,602	10,079	4,846
Science and Technology.....			
Science and Technology.....	25,842	13,960	17,165
Site Operations.....			
Site Operations.....	35,144	21,938	25,115
Program Direction.....			
Program Direction - EM.....	163,754	131,073	130,257

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	FY 1995 COMPARABLE	FY 1996 COMPARABLE	FY 1997 REQUEST
Nuclear Materials & Facilities Stabilization			
Nuclear Materials & Facilities Stabilization.....	1.077	6.413	2.394
Policy and Management			
Policy and Management.....	48.782	16.344	36.430
Environmental Management Science Program			
Environmental Management Science Program.....	22.650	62.575	52.136
TOTAL DEFENSE ENVIRONMENTAL RESTORATION & WASTE MANAGEMENT.....	523.952	632.610	653.798

OTHER DEFENSE ACTIVITIES

Verification and Control Technology			
Arms Control.....	11.733	27.222	27.685
Intelligence.....	501	50	0
Nonproliferation & Verification R&D.....	11.692	2.731	10.674
TOTAL Verification and Control Technology.....	23.926	30.003	38.359
Nuclear Safeguards and Security			
Security Affairs.....	13.414	11.256	12.511
Security Investigations			
Security Investigations.....	4.140	1.191	3.340
Naval Reactors			
Naval Reactors Development.....	0	32	0
Program Direction - NE.....	7.888	9.998	9.032
TOTAL Naval Reactors.....	7.888	10.030	9.032
Worker and Community Transition			
Worker and Community Transition.....	0	36.532	62.659
Program Direction - WT.....	4.268	4.329	4.341
TOTAL Worker and Community Transition.....	4.268	40.861	67.000
Fissile Materials Control & Disposition			
Fissile Materials Control & Disposition.....	3.765	4.182	30.813
Program Direction - MD.....	1.426	3.582	3.633
TOTAL Fissile Materials Control & Disposition.....	5.191	7.764	34.446
Emergency Management			
Emergency Management.....	5.879	6.766	6.694
Environment, Safety, and Health			
Environment, Safety, and Health.....	46.036	45.617	40.407
Program Direction - EH.....	10.810	11.766	10.706
TOTAL Environment, Safety, and Health.....	56.846	57.383	51.113
Program Direction			
Program Direction - NN.....	78.527	75.836	89.164
International Nuclear Safety			
International Nuclear Safety.....	1.262	900	500
Nuclear Security			
Nuclear Security.....	0	0	1.000
TOTAL OTHER DEFENSE ACTIVITIES.....	201.341	241.990	313.159

DEPARTMENTAL ADMINISTRATION

Office of Policy			
Policy Analysis & Systems Studies.....	3.505	2.900	3.493
Program Direction - PO.....	19.004	18.354	20.201
Environmental Policy Studies.....	3.642	2.400	4.928
TOTAL Office of Policy.....	26.151	23.654	28.622

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Chief Financial Officer			
Office of Chief Financial Officer.....	25.828	24.192	26.137
Congressional, Public, and Intergovernmental Affairs			
Public Affairs.....	54	50	65
Program Direction - CP.....	11.371	10.039	11.124
Consumer Affairs.....	46	40	40
TOTAL Congressional, Public, and Intergovernmental Affairs.....	11.471	10.129	11.229
General Counsel			
General Counsel.....	18.165	18.877	20.837
Office of the Secretary			
Office of the Secretary.....	3.416	3.352	2.850
Board of Contract Appeals			
Board of Contract Appeals.....	763	569	578
Cost of Work for Others			
Cost of Work for Others.....	2.000	2.000	0
Human Resources & Administration			
Program Direction - HR.....	125.979	111.675	119.166
Economic Impact & Diversity			
Program Direction - ED.....	4.925	4.364	4.836
Minority Economic Impact.....	1.118	1.673	1.726
TOTAL Economic Impact & Diversity.....	6.043	6.037	6.562
TOTAL DEPARTMENTAL ADMINISTRATION.....	219.816	200.485	215.981
OFFICE OF THE INSPECTOR GENERAL			
Office of the Inspector General			
Office of Inspector General.....	6.523	5.416	5.834
TOTAL OFFICE OF THE INSPECTOR GENERAL.....	6.523	5.416	5.834
FEDERAL ENERGY REGULATORY COMMISSION			
Hydropower Regulation			
Hydropower Regulation.....	57.531	55.751	55.789
Electric Power Regulation			
Electric Power Regulation.....	35.639	33.451	33.473
Natural Gas and Oil Regulation			
Natural Gas and Oil Regulation.....	73.003	70.088	70.135
TOTAL FEDERAL ENERGY REGULATORY COMMISSION.....	166.173	159.290	159.397
FOSSIL ENERGY RESEARCH AND DEVELOPMENT			
Coal Research and Development			
Advanced Research and Tech. Development.....	4.850	5.481	6.661
Advanced Clean Fuels Research.....	386	197	170
Advanced Clean/Efficient Power Systems.....	3.014	7.864	2.805
TOTAL Coal Research and Development.....	8.250	13.542	9.636
Oil, Gas, and Shale Research and Development			
Natural Gas Research.....	14.133	36.160	34.573
Fuel Cells.....	496	535	466
Oil Technology.....	3.578	2.057	1.215
TOTAL Oil, Gas, and Shale Research and Development.....	18.207	38.752	36.254
Program Direction and Management Support			
Headquarters Program Direction.....	17.725	15.649	14.901
Energy Technology Center Program Direction.....	809	0	0
TOTAL Program Direction and Management Support.....	18.534	15.649	14.901

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WASHINGTON HEADQUARTERS	FY 1995 COMPARABLE	FY 1996 COMPARABLE	FY 1997 REQUEST
Environmental Restoration			
Environmental Restoration - FE.....	13.635	10.894	11.861
Cooperative R&D Ventures			
Cooperative R&D.....	733	0	0
Fuels Conversion (Natural Gas and Electricity)			
Fuels Conversion, Natural Gas and Electricity.....	2.395	2.300	1.888
Plant & Capital Equipment			
Plant - FE.....	0	2.304	2.304
Capital Equipment - FE.....	300	1.701	1.000
TOTAL Plant & Capital Equipment.....	300	4.005	3.304
TOTAL FOSSIL ENERGY RESEARCH AND DEVELOPMENT.....	62.054	85.142	77.844
CLEAN COAL TECHNOLOGY			
Clean Coal Technology			
Clean Coal Technology.....	36.276	150.000	-500.000
TOTAL CLEAN COAL TECHNOLOGY.....	36.276	150.000	-500.000
NAVAL PETROLEUM AND OIL SHALE RESERVES			
Naval Petroleum and Oil Shale Reserves			
Naval Petroleum and Oil Shale Reserves.....	2.385	2.300	2.300
TOTAL NAVAL PETROLEUM AND OIL SHALE RESERVES.....	2.385	2.300	2.300
ENERGY CONSERVATION			
Building Technologies, State, & Community Sector			
Research & Development.....	42.690	33.990	62.506
Grants.....	32.860	1.690	2.000
TOTAL Building Technologies, State, & Community Sector.....	75.550	35.680	64.506
Industrial Technologies			
Industry Sector.....	59.783	39.414	91.335
Transportation Technologies			
Transportation Sector.....	34.933	41.636	49.675
Policy and Management			
Policy and Management - EE.....	29.895	22.776	20.297
Federal Energy Management Program			
Federal Energy Management Program.....	3.274	5.664	17.750
TOTAL ENERGY CONSERVATION.....	203.435	145.170	243.563
NUCLEAR WASTE FUND			
Nuclear Waste Disposal Fund			
Nuclear Waste Fund.....	193.122	41.444	56.900
Program Direction - RW.....	26.233	28.549	29.740
TOTAL Nuclear Waste Disposal Fund.....	219.355	69.993	86.640
TOTAL NUCLEAR WASTE FUND.....	219.355	69.993	86.640
DEFENSE NUCLEAR WASTE DISPOSAL			
Defense Nuclear Waste Disposal			
Defense Nuclear Waste Disposal.....	74.633	200.519	141.397
TOTAL DEFENSE NUCLEAR WASTE DISPOSAL.....	74.633	200.519	141.397
ECONOMIC REGULATION			
Economic Regulation			
Compliance.....	5.689	3.625	0

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WASHINGTON HEADQUARTERS	FY 1995 COMPARABLE	FY 1996 COMPARABLE	FY 1997 REQUEST
Hearings and Appeals			
Office of Hearings and Appeals.....	6,719	2,672	2,725
TOTAL ECONOMIC REGULATION.....	12,408	6,297	2,725
STRATEGIC PETROLEUM RESERVE			
SPR - Facilities Development			
SPR - Facilities Development.....	5,209	5,679	5,234
TOTAL STRATEGIC PETROLEUM RESERVE.....	5,209	5,679	5,234
STRATEGIC PETROLEUM RESERVE - PETROLEUM ACCOUNT			
SPR - Petroleum Account			
SPR - Petroleum Account.....	500	500	500
TOTAL STRATEGIC PETROLEUM RESERVE - PETROLEUM ACCOUNT.....	500	500	500
ENERGY INFORMATION ADMINISTRATION			
Energy Information Administration			
National Energy Information System.....	83,930	71,925	65,719
TOTAL ENERGY INFORMATION ADMINISTRATION.....	83,930	71,925	65,719
PAYMENTS TO STATES			
Payments to States			
Payments to States.....	2,515	2,515	2,515
TOTAL PAYMENTS TO STATES.....	2,515	2,515	2,515
TOTAL WASHINGTON HEADQUARTERS.....	2,326,421	2,569,125	2,419,050

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	FY 1995 COMPARABLE	FY 1996 COMPARABLE	FY 1997 REQUEST
WASTE ISOLATION PILOT PLANT			
DEFENSE ENVIRONMENTAL RESTORATION & WASTE MANAGEMENT			
Waste Management			
Waste Management.....	169.804	177.700	165.951
TOTAL DEFENSE ENVIRONMENTAL RESTORATION & WASTE MANAGEMENT.....	169.804	177.700	165.951
TOTAL WASTE ISOLATION PILOT PLANT.....	169.804	177.700	165.951

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WELDON SPRINGS REMEDIAL ACTION PROJECT	FY 1995 COMPARABLE	FY 1996 COMPARABLE	FY 1997 REQUEST
ENERGY SUPPLY RESEARCH AND DEVELOPMENT ACTIVITIES			
Environmental Restoration and Waste Management			
Environmental Restoration.....	41.403	58.500	67.500
TOTAL ENERGY SUPPLY RESEARCH AND DEVELOPMENT ACTIVITIES	41.403	58.500	67.500
TOTAL WELDON SPRINGS REMEDIAL ACTION PROJECT.....	41.403	58.500	67.500

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WESTERN AREA POWER ADMINISTRATION	FY 1995 COMPARABLE	FY 1996 COMPARABLE	FY 1997 REQUEST
OTHER DEFENSE ACTIVITIES			
Worker and Community Transition			
Worker and Community Transition.....	82	0	0
TOTAL OTHER DEFENSE ACTIVITIES.....	82	0	0
OFFICE OF THE INSPECTOR GENERAL			
Office of the Inspector General			
Office of Inspector General.....	815	686	788
TOTAL OFFICE OF THE INSPECTOR GENERAL.....	815	686	788
FALCON & AMISTAD - OPERATION & MAINTENANCE FUND			
Falcon & Amistad Operating and Maintenance Fund			
FA - Operation and Maintenance.....	0	1,000	970
TOTAL FALCON & AMISTAD - OPERATION & MAINTENANCE FUND.....	0	1,000	970
WESTERN AREA POWER ADMIN. CONST., REHAB., OPER. & MAINT.			
Systems Operation and Maintenance			
WAPA - Operation and Maintenance.....	211,481	161,675	143,437
Program Direction - WP			
Program Direction - WP.....	114,215	119,557	109,028
TOTAL WESTERN AREA POWER ADMIN. CONST., REHAB., OPER. & MAINT.....	325,696	281,232	252,465
COLORADO RIVER BASINS POWER MARKETING FUND (WAPA)			
Colorado River Storage Project			
Colorado River Basins Fund.....	79,716	102,304	91,769
Program Direction			
Program Direction.....	26,241	27,110	28,662
TOTAL COLORADO RIVER BASINS POWER MARKETING FUND (WAPA).....	105,957	129,414	120,431
TOTAL WESTERN AREA POWER ADMINISTRATION.....	432,550	412,332	374,654

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Y-12 PLANT

	FY 1995 COMPARABLE	FY 1996 COMPARABLE	FY 1997 REQUEST
ENERGY SUPPLY RESEARCH AND DEVELOPMENT ACTIVITIES			
In-House Energy Management			
In-House Energy Management.....	1.379	0	0
TOTAL ENERGY SUPPLY RESEARCH AND DEVELOPMENT ACTIVITIES.....	1.379	0	0
WEAPONS ACTIVITIES			
Stockpile Management			
Stockpile Management.....	341.929	391.675	370.615
Stockpile Stewardship			
Stockpile Stewardship.....	29.777	18.365	5.930
TOTAL WEAPONS ACTIVITIES.....	371.706	410.040	376.545
DEFENSE ENVIRONMENTAL RESTORATION & WASTE MANAGEMENT			
Environmental Restoration			
Environmental Restoration.....	29.161	27.001	24.042
Waste Management			
Waste Management.....	39.934	37.344	31.718
TOTAL DEFENSE ENVIRONMENTAL RESTORATION & WASTE MANAGEMENT.....	69.095	64.345	55.760
TOTAL Y-12 PLANT.....	442.180	474.385	432.305

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TOTAL DEPARTMENT OF ENERGY.....	<u>22,154,817</u>	<u>21,606,579</u>	<u>20,914,688</u>

Mr. BAKER of California. So we will know site-specific where you think we are going to be making downsizing or changes?

Mr. VIVONA. Yes.

Mr. BAKER of California. Okay.

Mr. ROHRABACHER. Thank you, very much, Mr. Baker. I would like to compliment you for bringing up a new concept and exploring that with this committee. And the Chairman—that's me—will be very happy to work with you—

[Laughter.]

Mr. ROHRABACHER. I will be very happy to work with you in developing that idea. I think it is a great idea.

Mr. BAKER of California. It is called "free enterprise." Adam Smith developed it just yesterday.

[Laughter.]

Mr. ROHRABACHER. Well said.

I think there is some merit to the points Mr. Baker has brought up today, and I think that we should think about that in terms of if indeed what we are trying to do is bring things—or make new realities in the marketplace for the United States and making the lives of our people better, that when those things do come on and do start making a profit for private companies, there is no reason to believe the government's investment in making that happen should not be returned to the taxpayers.

If some formula can be worked out—the gentleman mentioned that it is working out in terms of Clean Coal—maybe we should be trying to make sure that every government investment in this area have that same type of stipulation.

So, Mr. Baker—

Mr. BAKER of California. I want to thank the Chairman, too, for his cooperation, and Mr. Hunter whose heart is really in the right place. They are all doing a good job, but I do not think we should be suckers any longer. That is what the election of 1994 was about.

Mr. ROHRABACHER. Well thank you very much.

We will now turn to Mr. Roemer.

Mr. ROEMER. Thank you, very much, Mr. Chairman.

I would like to get back to the discussion the Chairman brought up in his line of questioning about what we call things, whether we call them "research" or "development."

Whatever semantics we use, I think think the Chairman and I share an unbending determination to get to a balanced budget. We might disagree occasionally on a different project as to what to cut and how to get there, and we may occasionally disagree on the rhetoric or the semantics in terms of what we call research and development.

Certainly this Committee spends a great deal of money on things that are not research and development. We spend money on the Space Shuttle. We spend money on the development and the implementation of technology like NEXRAD RADARs, and most of us have all voted for that technology and for that Space Shuttle to be safely developed and deployed.

We spend money supporting Lockheed, and Boeing, and McDonald Douglas on developing single-staged orbit vehicles, which I support.

That is because sometimes the private sector does not want to engage in some of the risk involved by themselves in these endeavors.

So I think we have to be careful when we just say everything has got to be research and development and how we define that.

Mr. Romm, you did a very good job—I am getting called for a vote in another Committee, so let me ask this question and then try to make the vote, and maybe defer to Mr. Doyle to go along the line that I am pursuing here—you did a good job last week in asking some questions about what is research and development particularly in renewables, which I am a strong supporter of.

I do not want to support money going toward slick literature and all kinds of promotional activity, per se, but how do we support the development end of this where the United States has been getting its clock handed to it by the Japanese and the Germans in moving from the research stage to making something marketable—not promoting it, but making it marketable?

Can you talk a little bit more about the renewable areas and how the Japanese and the Germans are spending a lot of money in these areas, and why this is a good expenditure for us as taxpayers?

And I apologize that I have got to run to make this vote. I will be right back.

Mr. ROMM. Historically I think the biggest problem for the country is that we have cut the technology pipeline funding short after what is called “applied research,” or perhaps “development.”

So what happens is, particularly Japan but also other countries have designed their government R&D programs around letting the United States do the R&D for them, see which—take all the risks, basically, see which technologies look to be promising and which don’t, and then they move into the marketplace.

I think this is a very big problem. I think the clearest instance of that is photovoltaics. In 1955 Bell Laboratories invented the first practical commercial photovoltaic cell. Then, funding by the National Science Foundation and NASA and the Pentagon gave the United States world leadership, so that by 1980 we had about 90 percent of the world market for photovoltaic cells.

The Federal Government, by and large, dramatically cut funding for everything but for basic research in photovoltaics and what you saw was, within three years of that, that the Japanese achieved market leadership in the sale of photovoltaics.

The Bush Administration developed a program called “PV-MAT” which was to improve the manufacturing technology of photovoltaics as they moved to more sophisticated fabrication techniques.

Within 3 years of the Bush Administration program the United States regained world leadership in photovoltaic sales, and in fact this Administration has continued funding for that program and renewable photovoltaic sales by the United States has tripled to \$300 million per year. It is a very large market. Some people think it will be a multi-hundred-billion-dollar-a-year market in the next century.

Is working with a consortia of manufacturers to improve manufacturing technology, is that R&D?

I personally think so.

Again, what are the other kinds of things that the Administration does are on the borderline between development and deployment?

We do field evaluations, applications' testing, assessment of market needs, corrective retrofit, performance monitoring, project underwriting, data collection, and similar actions.

This is a gray area. If we do not do it and the Japanese do do it, what will happen in the next 5 to 10 years is what happened in the 1980's, which is that the Japanese and Germans snapped up 60 percent of the United States' photovoltaic companies. It would be a crying shame if the technology that the United States' scientists developed and the United States Government has supported for 20 or 30 years was a job producer for foreign countries because we cut Congressional funding at the wrong place in the technology pipeline.

Mr. ROHRABACHER. Thank you very much, Mr. Romm.

Mr. Roemer's time is up right now, and I would like to—and again, you are a very articulate person for your point of view, and I respect that very much. Although there are some disagreements, the fact is that you are aggressively pursuing things you believe in, and that is what these committee hearings are all about.

Mr. Ehlers?

Mr. EHLERS. Thank you, Mr. Chairman.

I would like to follow up on a portion of your opening statement, Mr. Chairman, and some of your earlier questions and express my concern about funding for certain areas of energy research, and also energy efficiency.

I know from conversations with Dr. Bartlett, who is also a member of this Committee, that he shares my concern about the energy resources for the next century.

It seems to me, in view of the importance of energy to the economy which we have talked about in previous hearings, it is ill-advised in the Congressional Budget request that energy research would be kept at a flat level.

It is my hope that through the efforts of the Administration and also through this Committee, and through the efforts of Dr. Bartlett and myself, that we can perhaps increase this and also help you in whatever way possible to make sure that those funds are used more appropriately in any and every case possible.

I also want to comment on the energy conservation budget which has come under some attack. I think part of the problem is we should not be calling it "energy conservation." It is really not energy "conservation." There has been somewhat of a shift, I think, and there should be even more. I think we should call it "energy efficiency research" and that should be the general thrust of it, because there is a big difference between conserving energy and using it efficiently.

Just the term "energy conservation" tends to restrict it to a certain subset of issues in basic research, and I think we have got to get beyond that and deal with areas of all energy use in every area—the transportation sector, the heating and cooling sector, the commercial sector. We can go on and on.

But we have a major problem developing in the next several decades in terms of energy supplies that is going to have a major impact on our Nation because we are one of the largest energy-consuming nations per capita, and also in transportation because we are one of the most spread-out countries in the developed world.

My comment, and you may respond if you wish, but this is more in the nature of a statement than a question: I really think we should rethink totally the money going into energy conservation and come back with a restructured program in energy efficiency. Outline the programs in a different fashion and I think you would probably get more support from the Congress, and certainly from this Subcommittee and our Full Committee.

So my concern is on energy research. Recognizing the depletion of our stock—and perhaps Congressman Bartlett wants to pursue that later in his question period, as well—but it seems to me we are just not zeroing in on what is really important in some of these areas, and I hope we can dedicate more resources to that are in both the energy and research line, and particularly in the energy—what is now called the “energy conservation” line.

Thank you.

Mr. ROMM. I appreciate your comments.

I realize that—and I myself recently wrote a book on this subject—there is a great confusion out there as to the difference between “conservation” and “efficiency.”

Conservation is typically doing less with less; turning the lights off, turning down the thermostat.

The program is actually, the Department calls it “The Energy Efficiency Program.” I realize that this is not successfully translated to all of the depths of Congress, or even of the American people.

Fundamentally we are sitting on a number of technologies that the Federal Government has funded and developed that can save the American taxpayers a tremendous amount of money while actually delivering better services—higher quality lighting, improved heating and cooling, controlled over-production processes.

I think we have an energy efficiency program here, but there is a vast number of people out there who think of it an energy conservation program. And part of the reason why we have deployment programs is to overcome this barrier.

Because you can imagine, if Members of Congress still think of it as an Energy Conservation Program, how many people in the private sector still think—small businesses still think that they have to sacrifice in order to save energy, which it is not the case.

I think that I would be delighted at some point to sit and go through with you the program in some detail to show you that I think this is an energy efficiency program. We do not have programs that call upon people to make sacrifices. We have programs that are trying to deliver very high technology into the marketplace that saves energy but actually improves the quality of life and improves the productivity of most businesses.

So I could not agree with you more. I would hope that all the Members here would call it “The Energy Efficiency Program.” It is something we feel very strongly about.

Mr. ROHRABACHER. Thank you very much, Mr. Ehlers. We appreciate that. I think that you have made some very important points both from the panel and from you, Mr. Ehlers.

I am going to call on Mr. Doyle now for his time period, but I am going to call on Mr. Bartlett to take over the Chair for a few minutes while I run to another Committee, like Mr. Roemer, for a roll call vote.

So, Mr. Doyle, you may proceed with your questioning, and you will be followed by Mr. Bartlett who will be the Chairman at the moment.

Mr. DOYLE. We certainly will miss you, Mr. Chairman.

[Laughter.]

Mr. DOYLE. Come back, quick.

Thank you, Mr. Chairman. I hope, Roscoe, that I will get a Chairman's "5 minutes." I do understand the difference between time, between us lowly members and the Chair. Five minutes seems to be very different.

Let me just say at the beginning, and I wanted to say for the benefit of my Chairman that—

Mr. ROHRABACHER. Hey, thanks a lot.

[Laughter.]

Mr. DOYLE. I will keep talking until you get back.

[Laughter.]

Mr. DOYLE. I just wanted to echo what our Ranking Member, Mr. Roemer, said that: as one of two Democrats along with Mr. Roemer who voted for the original balanced budget amendment, two of the group of 70 Democrats that did that, we share many of our friends on the other side of aisle's commitment towards balancing the budget.

Where we part company is on how to get there.

Within the confines of a balanced budget amendment, this Committee last year when we were discussing energy R&D funding, and I suspect again this year, have argued quite strongly for keeping our commitment to energy research and development within the confines of a balanced budget agreement.

I would like to say also for the record—and I think it is no secret—that the amount of money that this country spends on energy research and development funding is 20 percent of what we spent back in 1978; that the commitment to research and development in this country has been on a steady decline in terms of constant dollars while we look to other countries in the world that are increasing the monies they spend on research and development.

So I think we need to keep that in mind.

And, that the percentage of our total federal energy R&D effort is a fraction, is a mere fraction of what we spend in total U.S. energy expenditures.

So I am pleased to see that, although the DOE budget for 1997 remains flat, that the Administration has requested an additional \$253 million increase for energy R&D, and I support that increase.

I would like to say that at the beginning.

I do have a couple of questions.

Mr. Vivona, I mean no disrespect to you—I know you were the invited witness today, and you are sort of the bean counter of the group, and it is good to see the program people sitting behind

you—and I say that with no disrespect—a lot of us that were here to discuss the entire \$4 to \$5 billion energy R&D budget were hoping to have some program people available, too, and I am glad that they have accompanied you.

I would suggest to the Chairman, who I understand said that he would be open to additional hearings, that if he has questions on programs like the Advanced Lightwater Reactor and other things, that we should hold hearings on those things.

There are a range of programs that are very important that need to be discussed. My experience has been in the 15 months that I have been here we have basically not had any hearings on these types of programs.

So I would encourage my Chairman—

Mr. ROEMER. Would the gentleman yield?

Mr. DOYLE. Yes, I will yield.

Mr. ROEMER. I am sure that the Chairman will be gracious with your time, since I am taking a little bit of time from you—but the Chairman did say, when I made an opening statement, that he would be willing to have additional hearings on Energy, or NOAA, or a host of other areas of we are specific in making those recommendations to him.

He has been very open to that, and I would strongly recommend the gentleman from Pennsylvania make a specific suggestion to the Chairman.

Mr. DOYLE. Thank you.

You can be assured that we will be doing that. Let me just ask a couple of questions.

I want to touch a little bit, since we talked about the advanced lightwater reactor and where we are with that program, I am just curious. There is a cost-sharing arrangement we all know that takes place in a program like the advanced lightwater reactor.

Could anyone speak to what the percentages are?

How much investment is taking place in the private sector as opposed to what we are investing here in government to provide money for that?

Mr. HUNTER. I think I know these numbers, but I am going to use my cheat sheet so I use the correct numbers.

For the lightwater reactor program through Fiscal Year 1996, the contribution by industry totals \$349.2 million, and the investment by the government is \$228.4 million.

Mr. DOYLE. I just wonder, just in your opinion—and not just the Advanced Lightwater Reactor, but a lot of the programs such as this, given what is going on in corporate America with the downsizing, and most notably, too, downsizing in their research and development budgets, what is the likelihood that technologies like this will continue to happen if we just withdraw federal support from programs like this, if we end this partnership that has been taking place over the years between government and academia and the private sector where we have these cost-sharing agreements?

Mr. HUNTER. Well I think Mr. Romm talked about this, but I can certainly speak for the Lightwater Reactor activity; that in the event the government pulls out, I think this technology will no longer be invested in by the private sector, either.

So that we would be yielding in this area I think to foreign competition.

Mr. DOYLE. And not only that, I want to make a point, too. When we talk about how America benefits, because I heard someone say we are never going to cite an Advanced Lightwater Reactor here in this country, we build them here in this country.

We employ Americans in this country.

So I guess one of the benefits we are going to talk about is, do we continue to build Lightwater Reactors in the United States, or do they just start to build them somewhere else and we no longer employ people?

I know Mr. Bartlett last year, and I supported him wholeheartedly, had sought an additional \$12 million in funding for Lightwater Reactors with the understanding I think that that would be paid back by Westinghouse.

I would like to see—you know, I support the program also. We use these terms “corporate welfare” interchangeably depending on whose ox is getting gored. I think that a lot of us here on this committee want to see a continuation of a partnership between the Federal Government and corporate America and academia where there is cost-sharing arrangements, and where there is benefit to things that go on in this country.

One more question I have.

Mr. Regula stated in his report language that he would seek to decrease the Fossil Energy R&D accounts over a period of 5 years, with approximately a 10 percent decrease in each year until we eventually got it down to the \$150 million range.

Last year in our budget we had a great debate here on this Committee over the level of decrease in fossil energy R&D, with the Chairman of our Committee seeking somewhere in the neighborhood of a 25 percent decrease, and fortunately we were able to see that decrease in the 10 percent range in accordance to what Mr. Regula had said.

What is the Administration’s—you know, it seems that the Administration request is following that same approach as Chairman Regula of Interior Appropriations. I just wonder what you think of the Regula approach of doing this over a 5-year period at approximately 10 percent?

Mr. KRIPOWICZ. Mr. Doyle, the 1997 request is approximately 10 percent below the 1996 Conference level in the Interior Appropriation, and we do believe that, rather than taking drastic reductions very early in the program, that if the program is going to be reduced it makes a lot more sense to do it over a longer period of time; to complete the work that we have cost-shared with industry in the main to finish a lot of the advanced technologies that we have partway through the development process.

So we would agree with that approach, as opposed to drastic reductions very early in the game which would lose all of the development money that we have put into the technology so far.

Mr. DOYLE. I think that is a very prudent approach, too, and I suspect we are going to fight that battle once again on this Committee.

I would just close by saying that I want to submit for the record a response to the Green Scissors Report Section on the Fossil Energy R&D.

I believe that some of that analysis is flawed and the record needs to be corrected, and I will be submitting a statement for that.

Thank you, Mr. Chairman.

Mr. BARTLETT [presiding]. Thank you very much.

We have about 5 minutes until we have to run for a series of votes, probably two votes. Mr. Roemer had a couple of questions he would like to ask, and then if time remains I may make a comment or two and ask a question.

Mr. Roemer?

Mr. ROEMER. Thank you, Chairman Bartlett.

I would like to ask a quick question about, first of all, Mr. Romm, getting back to your rather good example about photovoltaics, I would like to ask you a follow-up.

Some people are now saying that wind energy prices are soon going to be very competitive with those of other energy sources. What is your interpretation of advocates of this position?

Do you agree with that?

Mr. ROMM. Absolutely.

We have wind in good sights already at 4 cents a kilowatt hour, 5 cents a kilowatt hour, which obviously is very competitive.

The program plan for the wind program is, if we can do another several years of R&D in wind, we believe we can deliver a wind turbine that can provide electricity at 2.5 cents a kilowatt hour in good wind sites. That would be above 16 miles an hour.

We have two goals: Improved R&D to lower the cost in wind sites. And then improved R&D and deployment to increase the area of the country where you can get cost-competitive wind. We think, and the Energy Information Administration thinks, that wind is going to be making deep market penetrations at home and abroad.

Mr. ROEMER. Great. I would encourage you to continue your work in these renewable areas, and I am hopeful that we will have another hearing on this.

My last question is: I am looking at the budget on field offices and management. I see that the request has actually gone up here from \$112 million to \$121 million.

At a time when we are downsizing and trying to cut some costs there and trying to cut personnel, why is that?

Mr. VIVONA. We are continuing to downsize the field offices and departmental administration. We did rely in 1996 on prior-year balances to sustain us through the year as we went through downsizing.

I can get the specific numbers for you to explain it—

Mr. ROEMER. I would very much like to see them, how they break down for staffing, and funding, and laboratories, and so forth and so on.

[The following information was received for the record:]

COMMITTEE: HOUSE SCIENCE COMMITTEE SUBCOMMITTEE ON
ENERGY AND ENVIRONMENT

DATE: March 21, 1996

WITNESS: Joseph F. Vivona
PAGE: 106, LINE: 2439

INSERT FOR THE RECORD

Departmental Administration Account

The Departmental Administration account is comprised of two major categories, Administrative Operations and Cost of Work for Others and Miscellaneous Receipts. Overall, the net account increases by about 38%; however, the Administrative Operations line, which reflects the actual activities funded by the program, increases by 4.6%

DEPARTMENTAL ADMINISTRATION ACCOUNT

(\$ millions)

	FY 1996 Adj	FY 1997	Change
Office of the Secretary	3.4	2.9	-14.7%
Personnel Compensation & Benefits	115.0	119.7	4.1%
Other Expenses	79.6	83.6	5.0%
Program Support	<u>10.9</u>	<u>12.4</u>	13.8%
Subtotal, Admin Operations	208.9	218.6	4.6%
Cost of Work	22.8	26.3	15.4%
Revenues	-122.3	-125.4	3.5%
Prior Year Balances and Other Adjustments	<u>-22.7</u>	<u>0.0</u>	<u>100.0%</u>
Net, Budget Authority	86.7	119.5	37.8%

Administrative operations are experiencing a reduction of 94 FTEs from FY 1996 levels (a 6% reduction). Position requirements funded in this request have declined 19% from the FY 1995 baseline. Payroll funding declines consistent with manpower reductions. These reductions, however, are offset in part by increases to reflect the FY 1997 pay raise; restoration of overtime and awards deferred in FY 1996; and, to eliminate furlough requirements.

A summary of the changes from FY 1996 to FY 1997 by Congressional control level follows:

o Office of the Secretary		-\$0.5 million
o Personnel Compensation and Benefits		\$4.7 million
o Reduced FTEs	-\$6.1 million	
o Buyouts	-\$0.7 million	
o Pay raise (4.2%)	\$4.5 million	
o Restoration of awards, overtime, and furlough	\$7.0 million	
o Other Expenses		\$4.0 million
o Inflation of 3.2%	\$2.4 million	
o Additional growth in Working Capital Fund	\$1.6 million	
o Program Support - Policy Studies		\$1.5 million
o Cost of Work for Others		\$3.5 million
Increased Federal work at Oakland		
o Miscellaneous Receipts		-\$3.1 million
o Prior year balances and other adjustments		<u>\$22.7 million</u>
Total Change		\$32.8 million

Mr. ROEMER. Finally, there is a report coming out today on efficiencies for our national laboratories, and I am going to be very interested in working with the Secretary of Energy on trying to see that there is not duplication and repetition in our national laboratories' missions.

With that, I appreciate your patience, Mr. Chairman.

Mr. BARTLETT. Thank you, very much.

In just a couple of minutes we have to run for this series of votes.

I would like to just make a comment or two, and to thank the panel very much. I am sorry I was in another hearing and could not be here for your testimony.

I would like to identify myself with the remarks of my colleague, Dr. Ehlers. I share his concern about our energy future.

Every year since the 1970's we have found less oil and pumped less oil in this country. It is not generally known by our people that we are on the down side of pumping oil in this country. As a matter of fact, in the Alaska Pipeline we have now pumped something like 9 billion barrels. There is maybe another three there.

If we are lucky, we may find another 3.2 billion in Anwar, and then there will be no more oil flowing through the Alaska Pipeline. Through that 48-inch line now flows 25 percent of all of our domestic oil production.

I share Mr. Ehlers enthusiasm for alternative and renewable energy sources, and I regret the fact that we have not had a consistent national policy that has provided the kind of tax incentives and the kind of support for research and R&D that could have made several of these techniques more competitive earlier.

I hope that we will be having additional hearings in these areas because I think that there are two needs. There is a need to provide more money in these areas, and there is a need for education of the Congress and of the American people in general so that they understand the potential of these areas to our energy future.

Let me just make the observation that, should we not be interested in both conservation and efficiency? If we are using up energy that we do not need to use, why would we want to do that? If you do need to use energy, then certainly you want to use it as efficiently as you can.

I had several questions I would like to ask you, and I will submit a couple of questions for the record that have to do with the support of fusion research and the DOE budget response in light of the Laboratory Operations Board draft release.

I will submit a couple of questions for the record relative to those.

Thank you all very much for being here and contributing to these hearings. Thank you.

Mr. VIVONA. Thank you.

Mr. BARTLETT. We are in recess now for 30 minutes.

[Brief recess.]

Mr. ROHRBACHER. The Subcommittee will come back to order.

Today we have double duty on this panel with Dr. Robert Huggett, who is Assistant Administrator for the Office of Research and Development at EPA.

He will cover the EPA's budget request and give us a view on the Safe Drinking Water Act reauthorization.

Now we will have—the next witness will testify after that, but we will go into Dr. Huggett's testimony, and then we will have the other witness who will be introduced and we will go through his testimony immediately thereafter.

So, Dr. Huggett, will you proceed? And if possible, if you could summarize your testimony; that would give us a lot of help here.

Dr. HUGGETT. Yes, sir. I will be as brief as possible, sir.

STATEMENT OF THE HONORABLE ROBERT J. HUGGETT, ASSISTANT ADMINISTRATOR, OFFICE OF RESEARCH AND DEVELOPMENT, U.S. ENVIRONMENTAL PROTECTION AGENCY

Dr. HUGGETT. Mr. Chairman and members of the Subcommittee, I am pleased to be here today to talk to you about the Office of Research and Development, and to talk to you about the changes that we have made in the Office of Research and Development over the past approximately 2 years that I have been here.

I talked to you last year about the process that we were going through, and I can tell you now that we have essentially completed it.

We have reorganized 12 research laboratories and 5 headquarters' offices into 3 national research laboratories, 2 national research centers, and 2 headquarters offices.

We have eliminated layers of bureaucracy. In fact, the Office of Research and Development's headquarters' staff has been reduced from 300 to less than 150.

We have given our senior managers greater responsibility and flexibility in administering the programs.

We are instituting a new strategic planning process to better define the role of research and development in the agency.

This process involves active input by EPA's programs and regional offices to ensure that the agency's critical research needs are recognized.

We also work with the Environmental Protection Agency's Science Advisory Board in addition to the National Academy of Sciences and the National Resource Council, and with the private sector to obtain recommendations and guidance as we go about our business.

We have expanded our program into the STAR area of extramural competitive research to take advantage of the vast intellectual capital that we have in our universities and our not-for-profit organizations.

At the outset we knew that it would take a lot of effort and a lot of diligence and patience. We have met the schedule that we set for ourselves.

In September of 1995, we completed our new organizational changes. The components are now established and staffed.

In November of 1995 we issued for review and comment a draft strategic planning document that describes the way we now plan, conduct, and evaluate our ongoing research.

The guiding principles of this strategy are as follows:

We focus our work on the most significant environmental risk.

We reduce uncertainty in risk assessments and focus on cost-effective risk prevention and risk management.

We balance human health and ecological research.

We build a strong core capability for conducting intramural research.

We utilize the best outside scientific experts through competitively awarded research grants and fellowships.

And we instill excellence through the highest level of independent peer review.

Guided by these principles, we used our risk prioritization process to determine the most critical near-term research needs that face us.

In doing this, we applied the criteria pertaining to human health and risk management and ecological health. Let me explain the questions that we use as we employ our risk prioritization process to determine where best to invest our research dollars:

One, we ask ourselves which problem areas represent the greatest risk? We have a set of criteria in the strategic plan that all of our research topics are examined with.

We ask what areas represent the greatest uncertainty in risk assessment. This does not necessarily say that the problems we are not working on are not important; but can we actually reduce uncertainty with our work?

And finally we ask where is the greatest opportunity to reduce the costs or increase the efficiency of risk management.

In this process, we identified the following six topics as areas of emphasis:

Drinking water disinfection, as part of the reason for this hearing.

Particulate matter in the atmosphere. Increasing data indicate that there is a great deal of sickness and mortality due to atmospheric particulate matter, and we need to better understand it.

Endocrine disruptors. This is an issue that is rapidly becoming a major issue in the press with the publishing of the latest document or book by Theo Colburn.

Pollution prevention and new technologies such as engineering cost data for cost/benefit analysis.

Emerging issues related to human health, including risk assessments and cost effective ways to collect toxicity data.

And, emerging issues related to ecosystem protection, including ecosystem risk assessments and guidelines.

Last April we received administrative approval to establish an independent Board of Scientific Counselors to the Office of Research and Development.

The Board will be composed of eminent outside scientists and engineers who will represent the range of disciplines integral to the work that we do.

On an ongoing basis, this Board will evaluate our science and engineering programs. It will evaluate our risk-management programs. It will evaluate our laboratories and our research management practices.

It will recommend actions to improve the quality of these functions and to evaluate and advise on the utilization of peer review within the office.

We demand good peer review and thorough peer review for all of our work.

We extensively circulated our draft strategic plan to the outside scientific community. Among the organizations that we have consulted and have received comment are the EPA Science Advisory Board, the National Research Council, Resources for the Future, the National Association of State Universities and Land Grant Colleges, the American Industrial Health Council, and the American Chemical Society, in addition to a very large number of independent scientists and engineers.

For Fiscal Year 1997, ORD has requested \$537.6 million, and 1931 total work years. Recognizing the current resource climate, ORD has made difficult choices between numerous competing priorities.

The Fiscal Year 1997 request reflects these choices in the form of internal redirections to maintain programs identified through the application of the risk criteria as high priorities.

Outright reductions in these areas have taken place where ORD activities do not significantly reduce risk or uncertainty. The research areas given high priority for funding in the 1997 budget request flow from our six near-term research priorities, as I have just mentioned. They are:

In drinking water we will continue to conduct research to develop a better understanding of the occurrence and health effects of water-borne bacteria, viruses, and protozoa; and we will continue research for anticipating the conditions under which people may be exposed to these organisms in drinking water. We will also continue to develop guidance that small communities can use to install and use economical, effective drinking water treatment systems, including disinfection.

We will increase our work in particulate matter in the atmosphere.

We will increase our work in environmental monitoring.

We will increase our work in community-based ecological research.

And we will be working on cost/benefit research to provide a better basis for our analyses of cost-effective and useful methods.

And finally, we will increase our work in endocrine disruptors.

Relative to drinking water, the Office of Research and Development has worked closely with the Office of Water in designing a research program that builds on our long history of drinking water research, and that addresses the key issues for the future.

The resulting research plan is currently undergoing review by the Environmental Protection Agency's Science Advisory Board.

One area of emphasis in our water research is going to be on microbial pathogens.

We know very little about the true extent of disease caused by microorganisms in drinking water. We know that waterborne disease outbreaks occur every year. Undoubtedly, many outbreaks occur that are either unrecognized or unreported.

In recent years, the protozoan *Cryptosporidium* has been increasingly recognized as a cause of waterborne disease. This organism was the culprit in the 1993 Milwaukee outbreak which affected more than 400,000 people, and we estimate that approximately 100 people died of the disease.

The Milwaukee outbreak has the distinction of being the largest documented waterborne pathogenic outbreak in the United States. We need to ensure that outbreaks like this one do not happen again.

We are conducting research on risk assessment. Many of our risk assessment tools and models that we use today were based on chemical contaminants. We are talking now about an organism that is alive, and it is a fundamentally different situation.

We are also going to be working on better methods and approaches for risk management. We are working with the American Waterworks Association's Research Foundation and others to conduct research on the removal and inactivation of pathogens by different water treatment processes.

We are going to be working on disinfection by-products. These are substances, or chemicals that are formed in the disinfection process.

Chlorine is the most widely used disinfectant, and its use produces numerous by-products in drinking water, including trihalomethanes, haloacetic acids, and chloral hydrate.

Alternate disinfectants such as ozone are increasingly used. They are used in part because they are more effective for organisms such as *Cryptosporidium*. However, the by-products of alternate disinfectants such as ozone have not been well studied, and we need to know more about the effects or the hazards of these components.

Currently EPA's research is focusing on the key data gaps and the toxicity of these by-products—by-products of chlorine and the alternate disinfectants.

One focus that we are using is on epidemiology to try to get a better handle of being able to determine or delineate the problems associated with disinfection by-products relative to the consumer.

The ranges now are too large for us to be able to use very well. The estimated number of cancer cases range from 1 to 10,000 within the American population. So what do you do with a number that is that wide?

Very briefly, the other parts of our program in drinking water are to be focused, and are focusing on such things as arsenic. Several studies have linked ingested arsenic with cancer of the skin and internal organs. There is some evidence that exposure to arsenic may also have noncancerous effects such as cardiovascular disease and diabetes.

There are a number of important scientific uncertainties concerning the current standard for arsenic. Research by our scientists are addressing several of the key scientific issues that impact risk assessment of arsenic in drinking water.

These studies are providing a better understanding of the effects on people, and a better method for detecting low levels of arsenic as well as methods of getting arsenic out of the water.

To conclude, I want to tell you that we are very proud of the progress we have made in updating and streamlining and focusing science and research in EPA.

We have built a program that maintains a high caliber of scientific core capability while availing ourselves of the very best outside science the country has to offer.

We are effectively managing our resources and setting research priorities within the funding levels we have. We have a strategic plan that is designed to endure and yet be flexible enough to adapt to the changes EPA and the Nation prioritizes over time.

We have made risk-based decision-making the core of our organization, our planning, and our client service. We believe we have been responsive to the needs and constructive criticisms of our stakeholders.

We believe we have created the vision, the mission, and the means to assure continuing attainment of the Nation's needs for sound environmental science.

Thank you, sir.

[The prepared statement and attachment of Dr. Huggett follow:]

**Statement of Dr. Robert J. Huggett
Assistant Administrator for Research and Development
U.S. Environmental Protection Agency
Before the Subcommittee on Energy and Environment
Committee on Science
U.S. House of Representatives
March 21, 1996**

Mr. Chairman and members of the Subcommittee, I am pleased to be here today at your invitation to discuss the Fiscal Year 1997 budget request for the U.S. Environmental Protection Agency's (EPA) Office of Research and Development (ORD) and to discuss current and planned research by EPA on drinking water. When I appeared before this Subcommittee last year, I described several major changes that we were making to improve the way we do business in ORD -- changes to strengthen our organizational structure as well as changes to improve the procedures we use to plan and manage our programs and resources.

As I mentioned at that time, these changes were critical for revitalizing our organization, providing the vigorous science needed by EPA to address the Nation's most pressing environmental concerns, and helping EPA prepare to address the increasingly complex problems of tomorrow.

These changes reflected -- and in some cases anticipated -- recommendations by the National Academy of Sciences, the National Academy of Public Administration, and other prestigious organizations.

Making these changes has been an intensive process, an investment of time and effort to improve our product -- sound science for informed decision-making. As planned, we completed several steps in this process in FY 1995 and we will complete the remainder in FY 1996. In FY 1997, we will begin to realize our investment as we become fully operational under our new management structure and planning process.

Accomplishments

These efforts build on the successes that ORD has achieved with its research programs, and ensure that we will be able to go the distance to meet new challenges. Some of our accomplishments highlight the expertise that we have built in our laboratories, often unique in the field of environmental science. Others demonstrate the role we have played as a catalyst for cooperative research with other Federal agencies, academia, industry, and others to leverage our resources and combine our intellectual capital.

Some examples of recent research projects demonstrate the achievements we have made in advancing scientific insight into the nature and prevalence of environmental pollutants, broadening our understanding of the complex effects that these materials can have on human health and the environment, improving the methodology needed to assess these risks as comprehensively and precisely as possible, and providing new technologies and techniques for prevention and control of pollution:

- o **Advancing research for safe drinking water.** Recent ORD studies identified new types of chemical byproducts created when ozone and other disinfectants interact with organic materials in drinking water. This research will help scientists and policymakers identify appropriate levels of disinfection and other treatment that will rid drinking water of disease-causing microorganisms such as Cryptosporidium while minimizing the formation of new contaminants that may cause other serious health effects. This is just one example of ORD's intensive research effort to help safeguard the Nation's drinking water. I will address this research in additional detail later in my testimony.
- o **Advancing the understanding of reproductive and developmental health effects.** Recent ORD studies determined that some chemicals can impair normal sexual development and reproductive ability by blocking the effects of the male hormone androgen. As government and industry address a growing concern that environmental pollutants may be the cause of serious reproductive disorders seen in wildlife populations and possibly in humans, these and other ORD findings add significantly to the fundamental knowledge needed to answer this question. ORD has made similar contributions to the state-of-the-science on other significant environmental health issues, including dioxin, neurotoxins, and particulate matter.
- o **Advancing economical hazardous waste clean-up.** At the North Island Naval Air Station in San Diego, California, a project demonstrating an innovative technology for cleaning up hazardous waste saved the Navy \$14 million in clean-up costs below what would have been spent using traditional methods. The project was conducted under ORD's longstanding Superfund Innovative Technology Evaluation (SITE) program, which has brought together engineers from government, academia, and industry to develop and test new technologies that can remediate hazardous waste in significantly less time and at less cost than existing techniques.
- o **Improving Risk Assessment.** ORD recently completed a set of draft guidelines that will improve the quality and consistency of EPA's ecological risk assessments. We expect to complete peer review by EPA's Science Advisory

Board and other independent reviewers this year. In final form, these guidelines will reduce current uncertainties and inconsistencies in the information that EPA policy makers need for effective, economical decisions.

- o **Advancing cost-saving partnerships.** ORD signed an agreement with three other Federal agencies in 1995 to collaborate on acquiring and using remote-sensing data from space satellites. Through this partnership, the Federal Government saved \$30 million for purchasing and using data that will be vital for monitoring environmental changes over time and supporting sound decision-making by Federal, state, and local officials on environmental and natural resources issues. ORD has entered into numerous research partnerships and collaborations with other agencies, academia, and industry, yielding benefits that far outweighed what each partner could have achieved alone.

Improving the Way We Do Business

These and other recent accomplishments by ORD share some common attributes. They demonstrate the excellent work that we can produce when we give priority to research on significant national environmental concerns; when we set out to substantially advance the state of the science in disciplines critical to environmental protection; when we give our scientists and engineers the opportunity to exercise their vision, initiative, and technical skills; and when we team with other agencies and science organizations to reach common goals.

These are the qualities that have guided the changes I described to you in my testimony last year. To make excellent science a matter of course at EPA, we have moved our research organization away from outmoded ways of structuring, planning, and managing its research. The changes we have made recognize the need to balance near-term and long-term research, to focus on the most significant environmental risks, to look at human health effects and ecological effects as related and not mutually exclusive concerns, and to look across media boundaries at complex environmental concerns.

As I described to you last year, the changes we have made include these:

- o We have reorganized from 12 research laboratories and five headquarters offices into three National Research Laboratories, two National Research Centers, and two headquarters offices. This reorganization has eliminated layers of bureaucracy, aligned our research program along EPA's risk assessment/risk management paradigm, consolidated related research functions, and given our senior managers greater responsibility and flexibility in administering their programs.

- o We are instituting a new strategic planning process to better define the role of research and development at EPA, and to set objectives and priorities for research which would help EPA assess and manage the most significant risks, in order to help us allocate our resources wisely. This process involves active input by EPA's Program and Regional offices, to ensure that the Agency's critical research needs are recognized. As environmental protection is moved to state and local governments, we will also seek their participation. We also work with EPA's Science Advisory Board, the National Research Council, and the private sector to obtain recommendations from the external scientific community.
- o Through our Science to Achieve Results (STAR) program, we have expanded our support for competitive extramural research to better utilize the vast scientific expertise outside EPA, and to prepare young scientists and engineers to meet tomorrow's emerging environmental challenges. In part, this program also leverages the resources of the National Science Foundation and other agencies to support research of mutual interest.

Meeting Our Milestones

At the outset, we knew that these changes would require time, effort, and initiative. We have met the schedule we set for ourselves in completing specific milestones along the way.

- o In September 1995, we completed our new organizational changes, the components of which are now established and staffed.
- o In November 1995, we issued for review and comment a draft Strategic Research Plan that describes the way we will now plan, conduct, and evaluate our ongoing research. The guiding principles of this strategy are these:
 - Focus on the most significant environmental risks.
 - Reduce uncertainty in risk assessment and focus on cost-effective risk prevention and risk management.
 - Balance human health and ecological research.
 - Build a strong core capability for conducting intramural research.
 - Utilize the best outside scientific expertise through competitively awarded research grants and fellowships.
 - Instill excellence through the highest level of independent peer review.
- o Priorities: Guided by these principles, we use our risk-based prioritization process to determine the most critical Near-Term Research needs. In doing this, we apply criteria pertaining to human and ecological health, risk management,

and methods and models development. Let me also explain the questions we ask ourselves as we employ our risk-based prioritization process to determine where to best invest our research dollars. We weigh potential research topics by asking: 1) which problem areas represent the greatest risk? 2) what areas represent the greatest uncertainty in risk assessment? and 3) where is the greatest opportunity to reduce the cost of or increase the efficacy of risk management? Having gone through this deliberation for FY 1997, we identified the following six topics:

- **drinking water disinfection** (e.g. potential health risks of Disinfection Bi-products)
- **particulate matter in air** (e.g. sizes of particles causing health effects)
- **endocrine disruptors** (e.g. to what extent such chemicals affect human reproduction)
- **pollution prevention/new technologies** (e.g. engineering cost data for cost benefit analysis)
- **emerging issues related to human health protection** (including risk assessment) (e.g. cost effective ways to collect toxicity data)
- **emerging issues related to ecosystem protection** (including risk assessment) (e.g. conducting field restoration projects)

These six priorities dovetail with and complement guidance provided by the National Science and Technology Council (NSTC) and the Committee on Environment and Natural Resources (CENR). Our research agenda also aligns additional topics necessary to help fulfill the Agency's non-discretionary mandates. These near-term priorities will be reevaluated periodically to assure that we are on target for addressing the most critical environmental issues.

- o In Fall 1995, we awarded our first FY 1995 competitive research grants under the expanded STAR (Science to Achieve Results) extramural research program, as well as our first STAR fellowships to support graduate studies by outstanding Master's Degree and Doctoral candidates in scientific areas critical for EPA's mission needs. We have announced our solicitations for proposals for FY 1996, with specific levels of support dependent on the availability of funds.
- o Last April, we received administrative approval to establish an independent Board of Scientific Counselors for ORD. The Board will be composed of eminent outside scientists who will represent the range of disciplines integral to the work we do. On an ongoing basis, the Board will evaluate ORD's science and engineering research programs, laboratories, and research-management practices; recommend actions to improve the quality of these functions; and evaluate and advise on the utilization of peer review within ORD. This is an

important step for strengthening scientific review of our program, complementing other actions we have taken to improve our internal and external peer review, and complementing the role of EPA's Science Advisory Board in reviewing specific scientific and technical products and research plans. We are completing the procedural requirements needed to formally establish the Board and name the members, and we look forward to announcing the establishment of the Board in the Federal Register once those steps are completed.

In setting, pursuing, and meeting each of these milestones, we engaged in extensive discussions with our colleagues from the larger scientific community. In every case, this interaction was invaluable for us in developing clear objectives, evaluating different options for action, and expeditiously meeting the schedules we had set for ourselves.

For example, we extensively circulated our draft strategic plan to the outside scientific and academic communities. Among the organizations with which we have consulted are the EPA Science Advisory Board, the National Research Council, Resources for the Future, the National Association of State Universities and Land Grant Colleges, the American Industrial Health Council, and the American Chemical Society, as well as many individual scientists and engineers. The final version of the plan will reflect careful consideration of the comments provided by these organizations and individuals.

We are also engaged in a comprehensive review of our program by the National Research Council. NRC's Committee on Research and Peer Review is assessing our structure, peer review procedures, long-term research program, and career development program. In an interim report issued in early 1995, the NRC Committee endorsed our strides in improving strategic planning, peer review, and extramural research support. In addition, NRC's Committee on Research Opportunities and Priorities in providing an overview of significant emerging environmental issues, examining promising research directions, and evaluating the role of EPA in the context of research being done by other organizations.

ORD'S FY 1997 BUDGET

ORD's FY 1997 budget is an outgrowth of its risk-based priority-setting process that establishes an environmentally and economically sound foundation for future research efforts. Senior ORD scientists and engineers, who are experts in their given fields, explicitly applied the health, ecological, and risk management criteria that are an integral part of this process to evaluate and rank potential research topics in the FY

1997 budget. Priority was given to research that would make the greatest contribution to reducing the uncertainty associated with risk characterization.

The goal was to ensure that ORD supports EPA, both at the Program Office and Regional level, in fulfilling its mandates. Additionally, ORD will focus limited research resources where they can make the most significant contributions to reducing risk. These actions are consistent with recommendations found in multiple reports produced by respected organizations such as the National Academy of Public Administration, the NRC, and the SAB. They are also consistent with the risk-based criteria and new strategic directions defined in our Strategic Plan. As I mentioned earlier, ORD's focus on risk runs throughout its planning and budgeting process, linking together these two areas and enabling ORD to look beyond the next fiscal year.

ORD's total request for FY 1997 is \$537.6 million and 1931 total workyears. Recognizing the current resource climate, ORD has made difficult choices between numerous competing priorities. The FY 1997 request reflects these choices in the form of internal redirections to maintain programs identified through application of the risk criteria as high priority, and outright reductions in those areas where ORD activities do not significantly reduce risk or uncertainty. Research areas given high priority for funding under the FY 1997 budget request flow from our six Near-Term Research Priorities and include:

- o **Drinking Water:** ORD will continue to conduct research to develop a better understanding of the occurrence and health effects of water-borne bacteria, viruses, and protozoa, and for anticipating the conditions under which people may be exposed to these organisms in drinking water. We will also continue to develop guidance that small communities can use to install and use economical, effective drinking water treatment systems, including disinfection.
- o **Particulate Matter in Air:** We will pursue research on airborne particles linked with pulmonary disease and other serious health effects. This research will yield new knowledge to help scientists and policymakers determine the critical factors that pose the most significant risks from exposure to particulate matter -- for example, by size and composition, what particles pose the greatest risks, where do these particles come from, and how are people likely to be exposed?
- o **Environmental Monitoring:** Building on the strengths of EPA's Environmental Monitoring and Assessment Program (EMAP), ORD will work in close partnership with other Federal agencies to integrate different systems used by scientists to monitor environmental conditions and identify trends in those conditions. This effort, coordinated as recommended by the NSTC, will give Federal, State, local, and private sector decision-makers more useful data at

less cost. It also focuses our monitoring work within the Agency mission and integrates our efforts on Global Change Research with other agencies. (This is linked to the Ecosystem Protection Near-Term Research priority.)

- o **Community Based Ecological Research:** This initiative will increase the Agency's capability to predict exposures or effects within a local watershed or ecoregion and will provide Federal, State, and local decision makers with more effective and appropriate management alternatives. (Relates to Near-Term Research priority on Ecosystem Protection.)
- o **Benefit/Cost Research:** ORD is providing critical support for the Agency's initiative in benefit/cost research by providing engineering analyses, cost accounting, and data standards development. This effort will support the development of more effective tools to enhance community-based risk management options, improve the quality of analysis for Agency regulations and guidelines, and address consistency and relevance limitations in the existing approaches for benefit/cost research. (Relates to Near-Term Research priority on Pollution Prevention and New Technology.)
- o **Endocrine Disruptors:** This initiative in endocrine disruptors research and their potential impacts on the human and wildlife endocrine systems will assess and address the current uncertainty associated with how and to what extent such chemicals affect these systems. Conduct of this research will be coordinated with other Federal agencies as recommended by the NSTC.

Many of these are areas designated as Near-Term Research Priorities in the Strategic Plan, and all have gone through ORD's risk-based priority-setting process as established in the Plan. In these high-priority areas, the extent of the research that ORD can perform will be limited by the available resources.

Now I would like to turn to the other topic of this hearing, oversight of our drinking water research program which serves as an example of how our new strategic planning and priority setting process works.

DRINKING WATER RESEARCH

Contamination of drinking water is a significant public health threat, and is one of the highest priorities for our research program. This is because of the exposure of large numbers of people to known and suspected contaminants, the most significant of which are disease-causing microorganisms (pathogens) and the by-products of chemical disinfection. Disease caused by waterborne pathogens can lead to illness,

and even death, particularly in people with compromised immune systems. A wide variety of disinfection by-products have been identified, some of which cause cancer and other toxic effects in laboratory animals. This risk of disinfection by-products must be weighed against the benefits that disinfection provides. The challenge in providing safe drinking water today lies in reaching an acceptable balance among these competing risks.

The Office of Research and Development has worked closely with the Office of Water to design a research program that builds on our long history of drinking water research and that addresses the key issues for the future. The resulting research plan is currently undergoing review by EPA's Science Advisory Board. After this review, we will work together with other Federal agencies, universities, and private research organizations to improve and then implement the research plan. We view our partnerships with other research organizations as vital for a successful research program.

We believe a reauthorized Safe Drinking Water Act will improve EPA's ability to implement its research plan and other administrative reforms now underway. Both the bipartisan bill H.R. 3392 (passed during the 103rd Congress), and the bipartisan Senate bill S.1316 (passed November 29, 1995), would allow EPA to better align research priorities and regulatory development. Both bills reflect our current belief that microbial contaminants and disinfection by-products are the highest research priority, and both bills signal the need to strengthen the scientific basis of drinking water standards. The Administration continues to strongly urge Congress to pass amendments to strengthen public health protection in the SDWA and improve the regulatory process. I would like to take a moment now to discuss in greater detail our drinking water research plan.

In making future decisions about ensuring the safety of public water supplies, EPA policy-makers need to know more about the actual health risks caused by microorganisms, the actual health risks caused by disinfection by-products, and how these risks can be simultaneously controlled. Better estimates of the risks, and the levels of contaminants that cause these risks, will lead to better decisions about the types of water treatment needed to reduce the risks. Currently, the range in costs of different treatment options is tremendous. EPA has estimated that, depending on the technology employed to address disinfectant by-products, costs for a large water treatment system that simultaneously controls microbial pathogens and disinfection by-products range generally from \$5 to \$120 per household per year, while for a small water treatment system, potential costs generally range from \$10 to \$270 per household per year. Research can lead to improvements in the lower cost technologies that provide acceptable levels of protection. Research planned for microbial pathogens, disinfection by-products, and arsenic is discussed below:

Research for Microbial Pathogens

We know very little about the true extent of disease caused by microorganisms in drinking water. We know that waterborne disease outbreaks occur every year (for example, 34 outbreaks were reported during the years 1991-1992). Undoubtedly many outbreaks occur that are either unrecognized or unreported. In recent years, the protozoan *Cryptosporidium* has been increasingly recognized as a cause of waterborne disease, and this organism was the culprit in the 1993 Milwaukee outbreak which afflicted 400,000 people and may have caused about 100 deaths. The Milwaukee outbreak has the distinction of being the largest documented waterborne pathogenic outbreak in the United States.

We need to ensure that an outbreak like the one in Milwaukee does not happen again. To do so, we need better knowledge about disease-causing microorganisms and how to control them. EPA's research program is answering important scientific questions about the health effects, exposure, risk assessment, and methods for management of pathogenic microorganisms in drinking water.

1) **Health Effects** - One important question is, what levels of *Cryptosporidium* in water will cause disease? In an EPA-sponsored study using one strain of *Cryptosporidium*, we found that a dose of 30 spores is the lowest dose at which symptoms of infection appear in a healthy person; and 130 spores is the average dose at which symptoms begin to appear. Ongoing and future research will examine the dose-response relationship for other strains of *Cryptosporidium*, the effects of low doses, and the dose-response for immune-compromised populations who are more vulnerable to infection.

2) **Exposure** - We are improving the present technology for detecting *Cryptosporidium* and *Giardia* (another disease-causing protozoan) in drinking water. The current method requires two days of laboratory work, and a high degree of technical expertise. EPA is investigating a number of approaches to develop improved methodologies that can be readily used by water utilities. These new methods will provide specific, accurate, quantitative data without the need for extensive training and experience in microscopy and parasitology.

Another important exposure question is determining the extent of microorganism occurrence in drinking water supplies. For example, for water systems that rely on groundwater, public health experts believe that most of the waterborne disease outbreaks are caused by viruses. It is known that viruses can pass from pollution sources through different soil types, but the extent to which this is a problem is not well understood. EPA and the American Water Works Association Research Foundation have jointly supported research to obtain data on the occurrence of viruses in

vulnerable public water supplies, such as groundwater impacted by untreated surface water. The study results indicated that 24% of the systems tested had viruses in the water. EPA research is also investigating how viruses survive and are transported in groundwater, and how to evaluate the vulnerability of groundwater systems.

3) Risk Assessment - We will use research results on the health effects of and exposures to these organisms to estimate the actual risks of microbial disease from drinking water. Current risk assessment methods were developed to assess risks from chemical contaminants, but additional considerations must be given to the risks of microorganisms. For example, a person exposed to a microorganism, as opposed to a chemical contaminant, may develop an immunity to future infections. Or, one person infected from a drinking water source may spread the disease to other people. EPA is sponsoring work to develop an appropriate risk assessment methodology for microorganisms, including the development of models to predict waterborne disease. For example, EPA sponsored a workshop for representatives of other Federal agencies to identify the proper elements and processes to perform microbial risk assessments.

4) Risk Management - To develop better approaches for risk management, EPA, the American Water Works Association Research Foundation, and others conduct research on the removal and inactivation of pathogens by different water treatment processes. The current research focus is on *Cryptosporidium*, which is much more resistant to disinfection than most other waterborne pathogens. Research has shown that the organism is flexible and that it can slip through water filters. EPA researchers are conducting comparative tests of different filtration systems to determine optimal removal conditions; and to evaluate the effectiveness of filtration followed by disinfection. Several technologies that are suited to use by small water systems are also being evaluated.

Research on Disinfection By-Products

Disinfection by-products are formed when a disinfectant reacts with naturally-occurring organic material in drinking water supplies. Chlorine is the most widely used disinfectant, and its use produces numerous by-products in drinking water, including trihalomethanes (THMs), haloacetic acids, chloral hydrate and others. Alternative disinfectants, such as ozone, are increasingly used, in part because preliminary evidence indicates that ozone may be more effective than chlorine against *Cryptosporidium*. Currently, about 100 treatment plants in the U.S. use ozone. In the near future ozone will be used as the primary drinking water disinfectant for all of Southern California (approximately 20 million people). However, the by-products of alternative disinfectants have not been well-studied, and the use of ozone may promote the growth of microorganisms in water distribution systems, because it breaks down organic material into a form that microorganisms can use as a food source.

Before the use of alternative disinfectants is encouraged we need better knowledge about potential by-products, their health risks, and how to control them. We also need more information on the actual risks posed by the use of chlorine, and how these risks can be reduced. EPA's research program is answering important scientific questions about the health effects, exposure, risk assessment, and methods for management of disinfection by-products in drinking water.

1) **Health Effects** - EPA relies on a combination of animal laboratory studies and epidemiology studies in humans to determine whether disinfection by-products cause significant health risks. Currently, EPA research is focusing on key data gaps in the toxicity of by-products of chlorine and alternative disinfectants that are most likely to cause health risks. Researchers are also investigating how these chemicals affect animals. Better understanding of animal effects will reduce uncertainty and enable a better assessment of whether the same effects are likely to occur in humans. A third emphasis is on epidemiology; past epidemiological studies of cancer and reproductive effects in relation to drinking chlorinated water have been inconclusive. In part this is due to the difficulty in estimating the levels of disinfection by-products that people have been exposed to over time. EPA researchers are developing improved epidemiological methods, which will lead to more informative future epidemiology studies.

2) **Exposure** - We are identifying the by-products that are formed from the use of alternative disinfectants using advanced research instrumentation and analytical methods. Many by-products have been found that have never been identified before. In these experiments, the use of alternative disinfectants produced fewer by-products, at lower concentrations, than are typically observed with chlorine. Additional research is needed to determine if these new by-products are toxic to humans.

3) **Risk Assessments** - Some epidemiological studies have suggested that elevated rates of cancer may be linked to consumption of chlorinated water. Estimates of additional cancer risk may range from 1 to 10,000 cases per year for the U.S. population. Of course, these risks must be weighed against reduced risks to health that chlorination provides by eliminating pathogens. Narrowing the broad range in cancer estimates will depend on results from health effects and exposure research, and on advances in risk assessment methodology. ORD is currently developing single chemical assessments for a number of disinfection by-products, using improved analytical and modeling techniques. Next, ORD will use the information on dose and toxicity for single chemicals to predict and assess risks associated with certain mixtures of by-products.

4) **Risk Management** - Information is needed on how to control disinfection by-products formed by different treatment processes, while ensuring effective control of microbial pathogens. ORD has contributed significantly to current knowledge of how to control THM formation. Current research is investigating other means such as

membranes, enhanced coagulation, and biological filtration. Research has begun on the control of ozone by-products, and on control of the organic carbon produced by the use of ozone. This organic carbon can enhance the growth of pathogenic microorganisms in water distribution systems.

Arsenic

Arsenic contamination of drinking water supplies is another important public health issue on which ORD is focusing attention. Several studies have linked ingested arsenic with cancer of the skin and internal organs, and there is evidence that exposure to arsenic may also have noncancer effects such as cardiovascular disease, diabetes, and reproductive toxicity. There are a number of important scientific uncertainties concerning the current standard for arsenic. Research by ORD investigators is addressing several key scientific issues that impact the risk assessment for arsenic in drinking water. These studies are providing a better understanding of the effects of arsenic on people and on better methods for detecting low concentrations of arsenic in the environment. EPA recognizes the need for industry support in efforts to develop a better scientific basis for the standard, improving the analytical methods for measuring arsenic in the environment, and developing better water treatment technologies to remove arsenic from drinking water supplies, particularly in small systems.

Integrated Research Program

As the issues just described demonstrate, a wide array of research is needed to better characterize the risks of drinking water contaminants, and to define effective management strategies for these risks. In conducting this research, ORD will rely to a large extent on in-house expertise in the three national laboratories and the national assessment center. This in-house research will be complemented by an extramural research program of competitively awarded cooperative agreements and grants. For example, the area of microbial pathogens and disinfection by-products is a special topic in our grant solicitation for FY 1996. It is critical to have industry participation in resolving these complex questions, and it is only through the cooperative efforts of EPA laboratories, outside scientific organizations, and partnerships with industry that we can ensure the safety of our drinking water.

CONCLUSION

To conclude my remarks to you today, we are proud of the progress we have made in updating, streamlining, and focusing science and research in EPA. We have built a program that maintains high caliber core scientific capability, while availing ourselves of the best outside science the country has to offer. We are effectively managing our resources and setting research priorities within these funding levels. We have a Strategic Plan that is designed to endure, yet be flexible enough to adapt to

changes in EPA and national priorities over time. We have made risk-based decision-making the core of our organization, our planning, and our client service. We believe we have been responsive to the needs and constructive criticisms of our stakeholders. We believe we have created the vision, mission, and means to assure continuing attainment of the Nation's needs for sound environmental science.

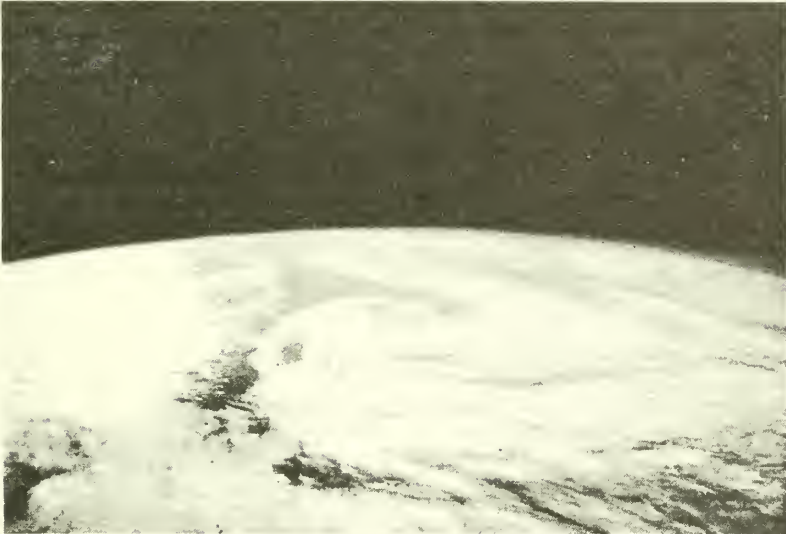
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ORD's Strategic Plan

Office of Research and Development

U.S. Environmental Protection Agency
Washington, DC 20460

November 1995

Foreword

I am very pleased to present for external peer review this new Strategic Plan for environmental research at the U.S. Environmental Protection Agency's (EPA's) Office of Research and Development (ORD). In recent years, many important groups—including EPA's Science Advisory Board and blue ribbon panels convened by the National Academy of Public Administration and the National Research Council—have made many excellent suggestions for improving science at EPA. This plan incorporates and builds on these ideas to provide a blueprint for charting a course of strong, credible science at EPA into the next century.

This plan is the culmination of a number of strategic changes to institute a more effective, risk-based research program at ORD. For example, we at ORD recently reorganized our nationwide system of laboratories to conform to the fundamental components of the widely used risk assessment and risk management processes. With this Strategic Plan, we are instituting a new system for determining research priorities based on risk assessment and risk management principles. We will use this system to sharpen the focus of our research by directing our resources where we can contribute most effectively to understanding and solving environmental problems, while also fully supporting EPA in fulfilling its mandates.

By providing clear mechanisms and opportunities for stakeholder involvement, this plan promotes greater partnership between ORD and its primary clients—EPA's program and regional offices—as well as the external scientific community. And, by clearly delineating ORD's research planning process, goals, and objectives, this plan is a tool our stakeholders can use to measure our success in providing practical, credible, and timely information and tools for risk-based decision-making.

We have designed this Strategic Plan to endure and yet be dynamic in the face of continually advancing scientific knowledge and understanding. That is why we have selected time-tested risk-based organizing and decision-making principles that transcend economic and political changes. At the same time, we have designed the plan to be flexible, providing capacity for our planning mechanisms to constructively adapt to changing EPA and national priorities over time.

We look forward to receiving external peer review comments on our new plan. We will modify the plan as appropriate based on these comments and publish a final plan in 1996. After that time, we will periodically revisit and, as necessary, modify this Strategic Plan to ensure the continued productivity of ORD's research and development efforts to meet EPA and national environmental goals.

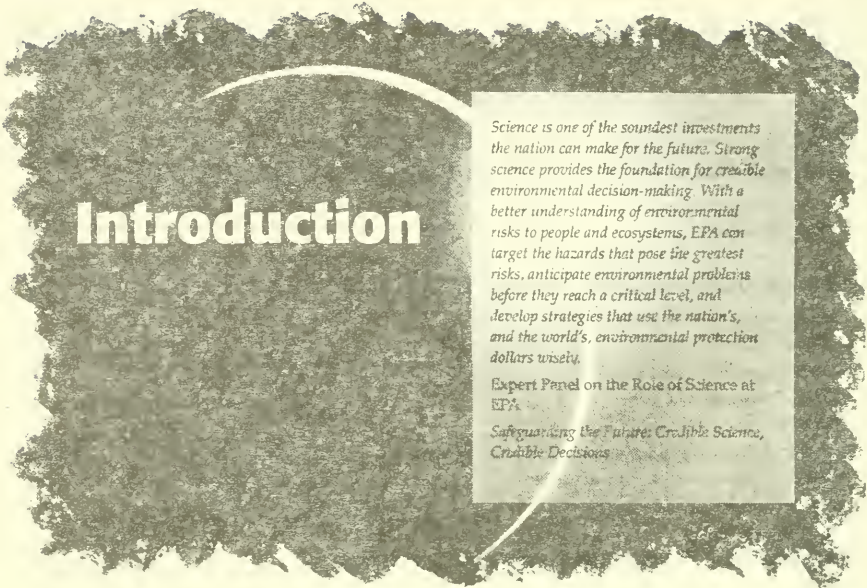
I firmly believe that this Strategic Plan, coupled with the other strategic changes we have instituted at ORD (listed on the back inside cover), offer unparalleled opportunities for ORD to improve the overall quality and relevancy of its research and development. I am confident that, in the coming years, these changes will serve as essential catalysts for moving EPA into the high-est echelon of leadership in environmental science.

Robert J. Huggett

Assistant Administrator
Office of Research and Development

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Introduction

Science is one of the soundest investments the nation can make for the future. Strong science provides the foundation for credible environmental decision-making. With a better understanding of environmental risks to people and ecosystems, EPA can target the hazards that pose the greatest risks, anticipate environmental problems before they reach a critical level, and develop strategies that use the nation's, and the world's, environmental protection dollars wisely.

Expert Panel on the Role of Science at EPA

Safeguarding the Future: Credible Science, Credible Decisions

In recent years, a convergence of thinking has occurred about science at the U.S. Environmental Protection Agency (EPA). The Agency's own Science Advisory Board (an independent group of engineering and science advisors to EPA) and expert blue-ribbon panels convened by the National Academy of Sciences (NAS)¹ and the National Academy of Public Administration² all have emphasized the importance of science at EPA and made many recommendations concerning its role and direction.

As these groups affirmed, science provides the foundation for credible environmental decision-making. It is vital to achieving a healthy population, thriving environment, and robust economy. Only through adequate knowledge about the risks to human health and ecosystems, and innovative solutions to prevent pollution and reduce risk, can we continue to enjoy a high quality of life. In July 1994, EPA published a *Five-Year Strategic Plan*³ that adopts strong science and credible data as one of seven guiding principles to

fulfill the Agency's mission to protect human health and environmental quality. While all of EPA uses science for policy and regulatory decision-making, and various EPA offices perform research, the responsibility for leadership in science at EPA and for the bulk of EPA's research and development work resides in EPA's Office of Research and Development (ORD).

ORD's Reinvention Around the Risk Paradigm

In the past two years, we at ORD have substantially changed our organization and operation so that we

¹ *Interim Report of the Committee on Research and Peer Review at EPA*. National Academy of Sciences Board on Environmental Studies and Toxicology. 1993. National Academy Press.

² *Setting Priorities, Getting Results: A New Direction for EPA*. National Academy of Public Administration. 1993. Washington, DC.

³ *The New Generation of Environmental Protection: A Summary of EPA's Five-Year Strategic Plan*. U.S. Environmental Protection Agency (EPA). 1994. EPA-200-2-94-001. Washington, DC.

Introduction

can strengthen EPA's science base and improve the Agency's and our nation's ability to effectively respond to the complex environmental challenges of the future. These changes represent a significant departure from the past. They are based on a set of strategic principles we have developed (Table 1) that draw upon the many recommendations we have received from outside groups in recent years. The most important of these principles is the explicit use of the risk paradigm to shape and focus our organizational structure and research agenda.

The risk assessment paradigm has been defined many times over the years, most notably in 1983 by the NAS (Figure 1), which consolidated and gave context to terms that had been defined in different ways up to that point.⁴ *Risk assessment* is the process that scientists use to understand and evaluate the magnitude and probability of risk posed to human health and ecosystems by environmental stressors, such as pollution or habitat loss or change. The resulting risk characterization, together with other public health, statutory, legal, social, economic, political, and technical factors, provides the critical input for deciding whether and how to manage the risk associated with a particular stressor. Risk management options may include both regulatory programs and voluntary activities (e.g., recycling) to reduce or eliminate production of the stressor.

The risk assessment process is one component of the overall process of risk management. The *risk management* process begins when a potential new risk comes to light and authorities decide or are mandated to respond to concern about the risk. It involves risk assessment as well as a series of other scientific and technical activities, illustrated in Figure 2, to provide the scientific and technical data for making and implementing a risk management decision. The risk management process ends when the selected risk management option(s) is implemented and the resulting environmental and/or public health improvements are monitored.

Figure 2 expands upon the "Risk Management Options" portion of the original NAS paradigm to show the many scientific and technical activities, in addition to risk assessment, that are essential to risk

Table 1. ORD's Strategic Principles

- Focus research and development on the greatest risks to people and the environment, taking into account their potential severity, magnitude, and uncertainty.
- Focus research on reducing uncertainty in risk assessment and on cost-effective approaches for preventing and managing risks.
- Balance human health and ecological research.
- Give priority to maintaining the strong and viable scientific and engineering core capabilities that allow us to conduct an intramural research and technical support program in areas of highest risk and greatest importance to the Agency.
- Through an innovative and effective human resources development program, nurture and support the development of outstanding scientists and engineers at EPA.
- Take advantage of the creativity of the nation's best research institutions by increasing competitively awarded research grants to further EPA's critical environmental research mission.
- Ensure the quality of the science that underlies our risk assessment and risk reduction efforts by requiring the very highest level of independent peer review and quality assurance for all our science products and programs.
- Provide the infrastructure required for ORD to achieve and maintain an outstanding research and development program in environmental science.

management. These include characterizing the sources of environmental problems; identifying risk management options and evaluating their performance, cost, and effectiveness; and monitoring improvements in environmental quality and public health that result from risk management activities. ORD is involved in all the areas depicted in Figure 2. In this way, ORD not only identifies and characterizes environmental problems but also helps to find and implement efficient, cost-effective solutions to these problems.

The first major step in ORD's reinvention was to reorganize ORD so that its new structure mirrors the risk paradigm shown in Figure 1. This new structure is described in Appendix B. ORD's new Strategic Plan is the second major step.

⁴The NAS paradigm was developed specifically to define risk assessment and risk management for human health. While ORD recognizes there are distinctions for ecological risk assessment, the general principles set forth in the NAS paradigm are still useful as an organizing focus for ORD's strategic thinking.

Figure 1. The Risk Assessment/Risk Management Paradigm



The risk assessment process consists of four steps:

- During **hazard identification**, scientists describe the adverse effects (e.g., short-term illness, cancer, reproductive effects) that might occur due to exposure to the environmental stressor of concern. To identify potential hazards, scientists use the results of experimental studies on test organisms, reports about accidental exposure, and epidemiologic research.
- During **dose-response assessment**, scientists determine the toxicity or potency of a stressor. The dose-response assessment describes the quantitative relationship between the amount of exposure to a stressor and the extent of injury or disease.
- During **exposure assessment**, scientists describe the nature and size of the population(s) or ecosystem(s) exposed to a stressor and the magnitude and duration of exposure. Exposure assessment includes a description of the pathways (e.g., air, food, water) by which the stressor travels through the environment; the changes that a stressor undergoes en route; the environmental concentrations of the stressor relative to time, distance, and direction from its source; potential routes of exposure (oral, dermal, or inhalation); and the distribution of sensitive subgroups, such as pregnant women and children.
- During **risk characterization**, scientists use the data collected in the three previous steps to predict the effects of human or ecological exposure to the stressor of concern. They estimate the likelihood that a population will experience any of the adverse effects associated with the stressor, under known or expected conditions of exposure. This estimate can be qualitative (e.g., high or low probability) or quantitative (e.g., one in a million probability of occurrence).

ORD's Strategic Plan

ORD's Strategic Plan, described in this document and illustrated in Figure 3, is ORD's blueprint for establishing a risk-based research program:

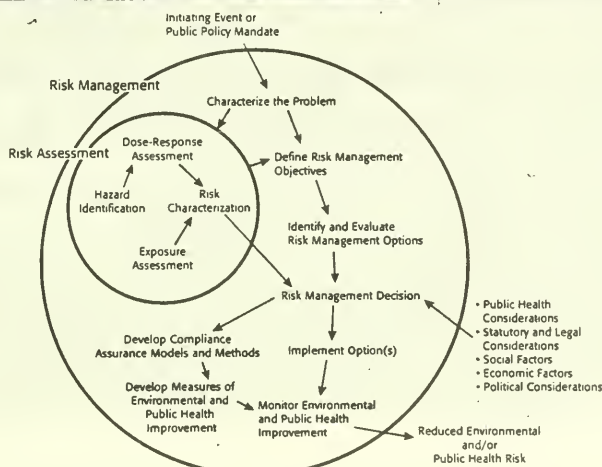
- **Part A** of the plan defines new strategic directions (including ORD's vision, mission, and goals) for ORD research, establishes a risk-based process that we will use to determine our future research priorities, describes how we translate

this Strategic Plan into a specific research program (including research plans, operating plans, and laboratory implementation plans), presents approaches to measuring success, and describes ORD's commitment to the infrastructure and human resources essential to implementing the Strategic Plan.

- **Part B** expands on ORD's goals and lists the specific research objectives and activities ORD will pursue to achieve its goals.

Introduction

Figure 2. The Scientific and Technical Contributions to Risk Management



Scientific and technical activities contribute to every stage of the risk management process. Environmental risk management is initiated when a potential new environmental risk comes to light (such as an unusually high disease rate in a particular population) and authorities decide or are mandated to investigate it.

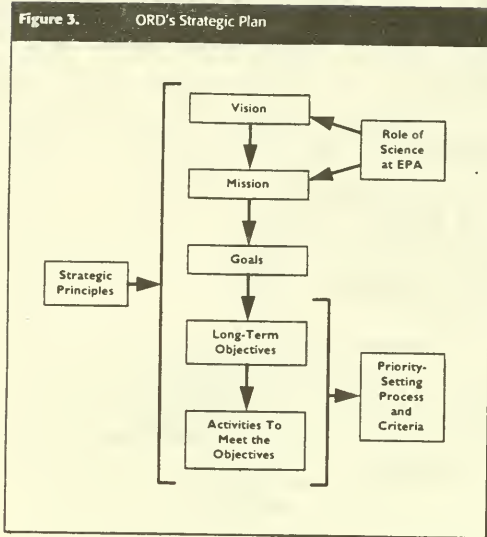
The first step is to *characterize the problem*. This involves such activities as determining which stressor(s) (e.g., pollutants, habitat loss) is causing the problem, characterizing the sources of the stressor(s), how these stressors reach target populations, and which human or ecological populations are affected. Once the problem has been sufficiently characterized, the risk assessment process can begin.

If sufficient information is available at this stage, scientists and engineers can also begin to *define risk management objectives* (i.e., the degree to which the risk should be managed or reduced) and *identify risk management options* that can meet the objectives. Frequently, however, these steps must await further information, provided by the risk assessment, on which populations are at risk and how great that risk is. Once potential options have been identified, scientists and engineers *evaluate the options* to determine their performance and cost. Risk management options may include, for example, pollution control technologies, banning or controlling the use of certain chemicals, cleaning up or preventing access to contaminated areas, implementing educational programs to encourage voluntary behavior changes on the part of the public or industry, and redesigning industrial processes to reduce or eliminate toxic waste production.

The resulting information on the feasibility of potential risk management options, together with the risk characterization (and public health, statutory, legal, social, economic, and political factors), is used to make a *risk management decision*. Typically, this will involve selecting one or more of the potential risk management options and designing a regulatory and/or nonregulatory strategy for implementing the chosen option(s).

Once a risk management strategy has been selected, scientists and engineers then *develop compliance assurance models and methods* (if the strategy is regulatory) and *measures of environmental and public health improvement* to monitor the success of the strategy in reducing risk to humans or ecosystems. Once the selected option(s) is implemented, scientists and engineers *monitor the environmental and public health improvement*. Monitoring data provide feedback to the risk management decision-makers about whether the risk management strategy is achieving the desired goals. Decision-makers may then amend the strategy, as necessary, based on these results. The final outcome of a successful risk management process is *reduced environmental and/or public health risk*.

Figure 3. ORD's Strategic Plan



- *Appendix A* describes the near-term research priorities that ORD has developed by applying the priority-setting process set forth in Part A to ORD's long-term objectives and activities.
- *Appendix C* describes ORD's management structure for implementing the Strategic Plan.

Again, this Strategic Plan is designed to endure while being dynamic. It includes sufficient flexibility to constructively adapt the planning mechanisms to changing EPA and national priorities over time. We will periodically revisit and, as necessary, modify the plan to ensure the continued productivity of ORD's research and development efforts to meet EPA and national environmental goals.

Part A

ORD's Research Strategy

[A] strategic plan should consist at a minimum of a vision statement, a mission statement, and a plan for achieving them. [It] should be robust and specific enough to enable [evaluation of] the intended role of ORD and its organizational components in providing scientific and technical knowledge to support national environmental programs, policies, and decisions, as well as to identify unnecessary geographical and functional duplication and significant gaps in ORD activities.

National Research Council
Interim Report of the Committee on
Research and Peer Review at EPA

ORD's commitment to develop a risk-based research agenda has required us to re-think our vision, mission, and goals and to develop a risk-based process for selecting and ranking those research topics of primary importance to ORD and EPA.

ORD's vision and mission for the future arise from a consideration of the importance of science at EPA and in the broader context of our nation's environmental research agenda, and of ORD's key role in environmental science (Table 2). Our vision, described below, represents the overall level of achievement that we will strive for in all our research and development work. Our mission statement, described below, defines the broad areas of research and development where we believe ORD can and must make important contributions to EPA's mission and mandates and to our nation's overall environmental research agenda.

ORD's Vision

ORD's vision is that:

ORD will provide the *highest quality* scientific and engineering knowledge and tools to serve as the basis for sound environmental decisions.

ORD's Mission

ORD's mission is to:

- *Perform research and development* to identify, understand, and solve current and future environmental problems.
- *Interpret and integrate scientific information* to help organizations at all levels make better decisions about improving the environment.
- *Provide national leadership* in addressing emerging environmental issues and in advancing the science and technology of risk assessment and risk management.

ORD's Research Strategy

Table 2. ORD's Key Role

Public and private sector institutions have long been significant contributors to our nation's environmental and human health research agenda. EPA's Office of Research and Development, however, is unique among scientific institutions in this country in combining research, analysis, and the integration of scientific information across the full spectrum of health and ecological issues and across both risk assessment and risk management. This broad scope has resulted in scientific and engineering expertise, physical facilities, and equipment that permit and encourage integrated multimedia and multidisciplinary research on environmental issues. As part of a regulatory Agency that establishes national priorities and sets national standards, ORD research is conducted to protect human and ecosystem health in a cost-effective manner and to provide a firm scientific and technical foundation for environmental decisions and standards.

ORD's Long-Term Goals and Objectives

ORD's three mission areas translate into six long-term, overarching goals that we will strive to meet in order to fulfill our mission (Table 3). Part B of this plan describes these goals in detail and breaks each goal down into a series of specific research objectives and activities that ORD will pursue to achieve its goals.

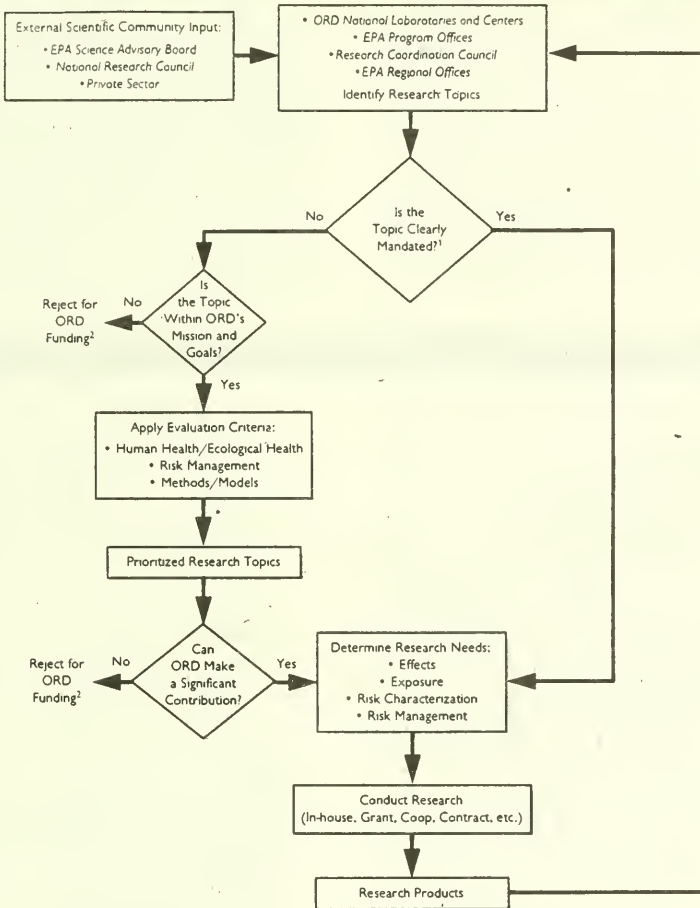
Table 3. ORD's Long-Term Goals

Mission Area	Goals
Perform research and development to identify, understand, and solve current and future environmental problems.	To develop scientifically sound approaches to assessing and characterizing risks to human health and the environment. To integrate human health and ecological assessment methods into a comprehensive multimedia assessment methodology. To provide common sense and cost-effective approaches for preventing and managing risks.
Interpret and integrate scientific information to help organizations at all levels make better decisions about improving the environment.	To provide credible, state-of-the-art risk assessments, methods, models, and guidance. To provide reliable scientific, engineering, and risk assessment/risk management information to private and public stakeholders.
Provide national leadership in addressing emerging environmental issues and in advancing the science and technology of risk assessment and risk management.	To provide national leadership and encourage others to participate in identifying emerging environmental issues, characterizing the risks associated with these issues, and developing ways of preventing or reducing these risks.

ORD's Priority-Setting Process

The objectives and activities listed in Part B of this plan provide detail about how ORD will go about meeting its goals. Each objective and activity still represents a relatively broad research area, however. ORD, therefore, has developed a priority-setting process that we will use to identify specific research topics within the objective and activity areas that are of primary importance to our vision, mission, and goals. ORD's new priority-setting process, depicted in Figure 4, involves the following steps:

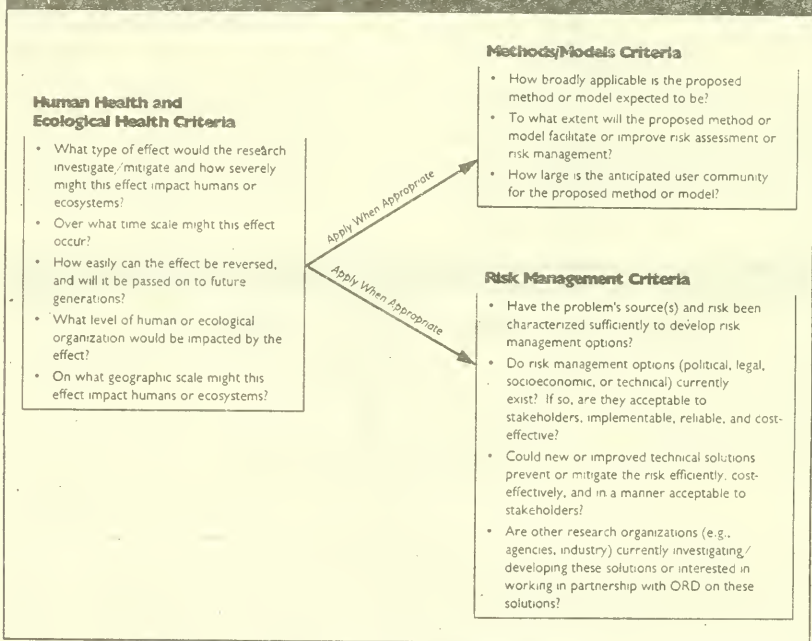
- First, we seek input from all parts of EPA. Research Coordination Teams consisting of senior representatives from ORD's new National Laboratories and Centers, the EPA program offices, the Research Coordination Council (see Appendix C), and EPA's ten regional offices identify the most important and relevant areas for our research efforts. (As more environmental protection is moved to state and local governments, their research needs will also be considered at this stage.) We also work with EPA's Science Advisory Board, the National Research Council, and the private sector early in the planning process to obtain recommendations from the external scientific community regarding the major scientific directions and priorities for our research program. Finally, we consider the status and results of our recent research activities. Based on this information, ORD identifies potential research topics.

Figure 4. Setting Research Priorities¹In other words, ORD has no discretion to reject or delay this research.²EPA program offices and regions may still choose to fund, using ORD labs, grants, contracts, etc., or a research source outside of ORD.

ORD's Research Strategy

- We then separate the pool of potential topics into two categories:
 - Those that are clearly mandated (i.e., ORD has no discretion to reject or delay the research).
 - All other topics.
- For all other topics, we narrow the pool by retaining only those that are within ORD's mission and goals.
 - We then apply a series of human health, ecological, and risk management criteria (Figure 5) to compare the mission-related topics according to their potential to support effective risk reduction. We also apply criteria (Figure 5) to consider whether the research would develop broadly applicable methods and models needed by EPA programs. Through this screening process, we set priorities among the research topics.
- We then further narrow this pool of topics by retaining only those areas where ORD can make a significant contribution to environmental science.
- For these remaining topics where ORD can make a significant contribution, as well as all nondiscretionary topics, we then define specific research and development projects by considering each topic in totality. For each topic, we determine what the research needs are within each component of the risk paradigm: effects (hazard identification and dose-response assessment), exposure assessment, risk characterization, and risk management. At this stage, we give priority to research that will make the greatest contribution to reducing the uncertainty associated with risk characterization.
- We then develop research, operating, and laboratory implementation plans (see below) for each

Figure 5. ORD Criteria for Evaluating and Ranking Potential Research Topics



project and conduct the research via a variety of mechanisms: in-house research, or external research via grants, cooperative agreements, or contracts. The research products and results provide input into future planning efforts.

This approach to strategic planning clearly indicates the following areas where *ORD will not continue to allocate resources*:

- Conduct of routine quality assurance programs in the program offices and regions.
- Support for routine environmental monitoring.
- Exposure or effects research in areas of low risk.
- Risk reduction research in areas of low risk.

Our new approach to strategic planning has many strengths. It encompasses both scientific and stakeholder priorities. It ensures that ORD will continue to fully support EPA in fulfilling its mandates. It focuses our resources where we can make the most significant contributions. And, it enables ORD to generate practical, credible information and tools for risk-based decision-making.

Risk Criteria for Setting ORD Research Priorities

A key component of ORD's new planning process is the criteria we will use to set priorities among non-mandate-related research topics. Three sets of criteria are used: human and ecological health criteria, risk management criteria, and methods/models criteria (Figure 5). These criteria, described below, are not set in concrete, nor are they universally applicable to all research areas. They likely will evolve with use and experience. Additional or alternative criteria may be used in some cases as appropriate.

Human and Ecological Health Criteria

ORD's human and ecological health criteria are based on five broad categories outlined in the EPA Science Advisory Board's 1990 report, *Reducing Risk: Setting Priorities and Strategies for Environmental Protection*: the severity of response, the time scale, permanence, and extent of the response, and the level of organization. Table 4 lists the criteria that ORD has developed for each of these five categories.

Risk Management Criteria

Risk management criteria are applied to those research topics that concern risk management. These criteria, listed in Figure 5, are designed to give priority to research that will produce the most effective and useful risk management options. The criteria consider whether sufficient risk characterization information is available to set meaningful objectives for the risk management research; the availability, acceptability to stakeholders, reliability, and cost-effectiveness of existing options; the potential benefits of the proposed research; and whether other research organizations are already conducting or interested in this type of research.

Methods/Models Criteria

The methods/models criteria are applied to research concerning the development or application of methods or models for gathering or analyzing risk-related data. These criteria give priority to research that will likely produce the most useful results. The criteria consider how broadly the method or model would be used, the size of the anticipated user community, and the degree to which the method or model would improve risk assessment or risk management.

Translating ORD's Strategic Plan Into a Research Program

The steps involved in translating ORD's Strategic Plan into a research program are illustrated in Figure 6. Each year, we will use this priority-setting process and the criteria described above to identify high-priority research topics that will help us achieve ORD's goals and objectives. (Appendix A lists ORD's current high-priority topics.) Many topics will remain a high priority for several years. Each year, we will examine the previous year's topics to add new topics as appropriate and remove previous topics for which sufficient research has been conducted.

Once we have identified our high-priority topics, we develop and implement a research program based on these topics. This involves three steps:

ORD's Research Strategy

Table 4. ORD's Human Health and Ecological Health Criteria		
	Ecological Health ¹	Human Health ¹
Severity of Response	• Mortality • Morbidity	• Premature mortality • Morbidity • Reproductive effects
Time Scale of Response	• Immediate effects • Effects that will occur in the future	• Acute effects • Subchronic effects • Chronic effects or effects with a long latency period
Permanence of Response	• Irreversible effects • Effects that can be reversed only by human intervention • Temporary effects that reverse naturally over a long time • Temporary effects that reverse naturally over a short time	• Transgenerational effects • Nontransgenerational effects
Level of Organization	• Effects on an entire ecosystem/community • Effects on a single species • Effects on a population within a single species • Effects on individual animals or organisms	• Effects on the general population • Effects on a subpopulation • Effects on individuals
Extent of Response	• Global effects • Ecoregional effects² • Effects on several localities • Localized effects	• Global effects • International effects • National effects • Effects on several localities • Localized effects

¹ Items are listed in descending order of priority.

² An ecoregion is a geographic area that has similar topography, climate, and biota across the entire area.

■ **Development of research plans.** For each selected research topic, Research Coordination Teams composed of ORD scientists and representatives of EPA's program offices and regions (see Appendix C) develop research plans that:

- Lay out the major research components and directions we will pursue over the next few years.
- Describe how these components fit into the risk assessment/risk management paradigm.
- Delineate the major outputs to be produced over the next three years.

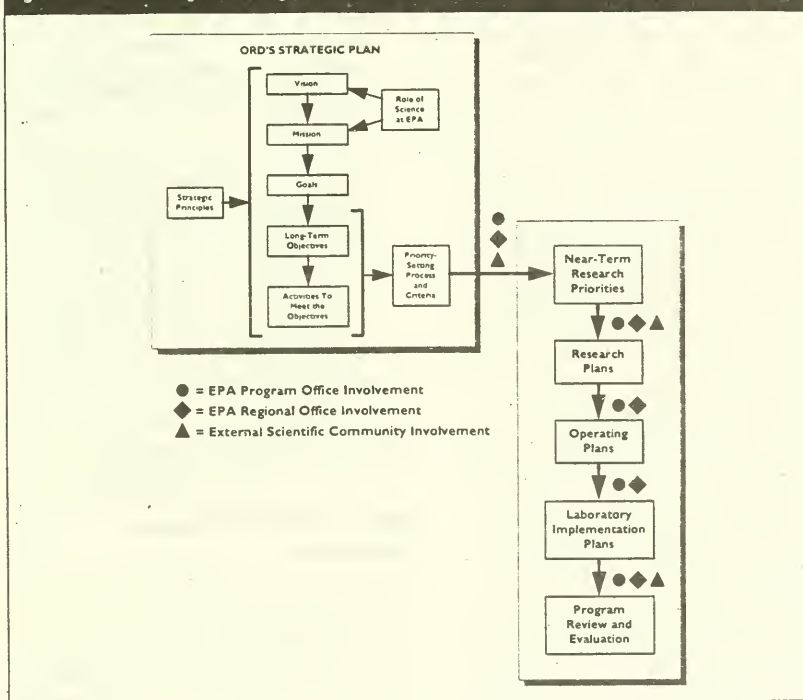
These plans make clear to our clients both the rationale for and the intended products of the research and thus are important tools for measuring accountability. They enable ORD to clearly track its progress toward achieving its goals, as required by the Government Performance and Results Act of 1993.

■ **Development of operating plans.** We then integrate the research plans with budgetary decisions in order to allocate resources to the selected research topics by laboratory program and research component. This helps ensure that our priority-setting decisions (guided by science) also reflect budgetary realities.

■ **Development of laboratory implementation plans.** Finally, based on the research plans and budgetary decisions, ORD's laboratories and centers develop detailed plans for implementing each area of research under their purview. These laboratory implementation plans provide a blueprint for laboratory and center work and form the basis for managerial oversight and guidance.

We involve ORD's main research clients—the EPA program and regional offices—in all three steps to ensure that final plans clearly include the research products that our clients need to fulfill their responsibilities.

Figure 6. Translating ORD's Strategic Plan Into a Research Program



Measuring Success

The success of a research organization can be measured in several ways: by the number of articles published in prestigious scientific journals, by the number of times that articles written by the organization's scientists are cited in other journal articles, and so on. For a mission-oriented organization like ORD, other measures, such as the extent that we help and support EPA in meeting its goals, are equally important.

In measuring the success of this Strategic Plan, the quality of the work that ORD is doing, and the usefulness of the products that result from ORD research, we use the following measures of success:

- **Significance:** *Is ORD working on the right issues?* This is a measure that the ORD program offices and regions and the broad scientific community can help us judge. For our research, development, and support efforts to be useful, we must work on the most important environmental issues and target areas for research that will significantly improve risk assessment and/or risk management in the Agency and elsewhere. Peer review by scientists in the external scientific community will assist us in judging significance.
- **Relevance:** *Is ORD providing data that the Agency can use?* This question can best be answered by the rest of the Agency and is best judged by the degree to which ORD's contributions support Agency decisions.

ORD's Research Strategy

■ **Credibility:** *Is ORD doing research of the highest quality?* ORD's credibility can best be judged by the external scientific community through such mechanisms as peer review of ORD products, reviews of programs at the ORD laboratories, peer-reviewed journal articles, scientific citations, and external recognition of both ORD and its people.

■ **Timeliness:** *Is ORD meeting EPA's expert consultation and assessment needs in a timely manner, providing research products according to schedule, and responding to long-term issues with adequate forethought and preparation?* The first part of this question can best be answered by EPA's program offices and regions as they determine whether ORD consultations and assessments are being provided in time to be optimally useful for Agency decisions. The middle part of this question can be answered by EPA's program offices and regions through annual program reviews and other activities. The final aspect of timeliness is more subjective and therefore more difficult to assess. ORD has accepted the challenge of anticipating important environmental issues that are just emerging and may not become critical problems until well into the next century. The U.S. public is the ultimate judge of how successful ORD has been in this effort. ORD will strive to routinely gather the public's view on this issue.

ORD has implemented or plans to implement several mechanisms for evaluating its performance, communicating progress and results, and measuring success. These include:

■ **Annual research program reviews**, jointly organized by ORD's Research Coordination Teams and EPA's program and regional offices, that will present to EPA senior managers the entire EPA research portfolio in a given area. These joint reviews will focus primarily on the status and accomplishments of the ORD research program to ensure that ORD's research continues to meet ORD and client objectives. They will also, however, present the ongoing research being conducted by the program offices and regions so that the total research agenda can be viewed. The objectives of these reviews are to evaluate progress in completing planned research projects, to track and evaluate research results, and to generally obtain feedback on ORD's work and any adjustments that may be needed to help us better meet our clients' needs. These reviews supple-

ment, rather than supplant, external peer reviews (see below).

- **Annual ORD review of its research plans.** ORD examines its research plans annually and adjusts them if warranted by our research results, by changes in EPA or national priorities, or by emerging issues and concerns.
- **External peer reviews** of ORD research plans and products and overall progress in meeting our goals and objectives. These reviews are conducted at each step in our research planning and implementation process.
- **Annual science workshops** designed to make the progress and results of all ORD research (including the external grants program) accessible to EPA's program offices and regions.
- **A data tracking system**, part of ORD's Management Information System, which tracks resources and progress.

Through these mechanisms, ORD will strive to develop and conduct the most responsive, scientifically justifiable research program possible within the constraints of our available resources.

Infrastructure and Human Resources

The success of ORD's Strategic Plan depends on an adequately funded and well-managed infrastructure. To effectively implement our Strategic Plan, we must provide our work force with:

- Safe, environmentally sound, well-maintained, state-of-the-art laboratories, equipment, and supplies.
- Environmental data management systems and advanced communications systems.
- A host of other management, administrative, and systems support.

ORD's strategic principles (Table 1) highlight the critical role of infrastructure "to achieve and maintain an outstanding research and development program in environmental science."

ORD will work, within the limits of our available resources, to maintain a sound, sufficient, and productive infrastructure by:

- Integrating planning for meeting infrastructure requirements into the research planning process.
- Focusing resources on those infrastructure components that are most important for achieving the

ORD's Research Strategy

goals and objectives set forth in ORD's Strategic Plan.

- Managing all infrastructure components to obtain maximum benefit and performance.

By far the most important component of ORD's infrastructure is our work force of scientists, engineers, managers, and support staff. ORD can achieve its vision of providing the *highest quality* scientific and engineering knowledge for environmental decisions only if we can attract, nurture, and support a world class work force. ORD's strategic principles (Table 1) emphasize the importance of nurturing and supporting "the development of outstanding scientists and engineers at EPA."

The cutting edge nature of research and development at ORD places great demands on our scientists and engineers to continually upgrade their skills and knowledge in response to and anticipation of new scientific developments. Therefore, our work force support must include an effective human resources program that encourages an increasingly diverse cadre of employees to continuously learn new skills and a career development program that promotes career development in directions congruent with ORD's mission. In addition, we must anticipate work force needs and recruit new culturally diverse employees with the appropriate skills and experience to support ORD's mission.

ORD's recent reorganization has introduced a new organizational structure (see Appendix B) and staffing pattern into ORD. For example, our new organization eliminates mid-level management positions and broadens the control span of supervisors. This flattened organizational structure will require a team-based matrix management approach to replace our former, more hierarchical approach to management.

ORD is addressing these needs and challenges by taking several steps to ensure a productive, world class work force. These include:

- Developing and implementing innovative, effective management approaches to accomplishing ORD's mission, such as matrix management and team-based operation.
- Supporting senior managers, via training and other mechanisms, in implementing these new management approaches.
- Developing tools to accurately assess current job effectiveness and determine development needs.
- Providing training and development programs to advance the knowledge and skills of ORD's staff.
- Providing effective career management support with an emphasis on self-directed career planning (e.g., through mentoring, in-placement and out-placement services, and career counseling and development services).
- Creating opportunities for professional and personal growth.
- Taking measures to maintain and enhance the scientific competence and quality of ORD staff.
- Building and maintaining solid linkages to the external scientific community, with an emphasis on scientist-to-scientist interactions (e.g., through ORD-sponsored scientific workshops).
- Providing opportunities for ORD scientists and engineers to contribute, as respected members of the scientific community and leaders in the environmental sciences, to the general scientific literature and community (e.g., through publication of scientific articles in peer-reviewed journals and participation in national and international scientific conferences).

As we implement our Strategic Plan, we will monitor work force needs and provide other programs, mechanisms, and support as necessary to cultivate a world class work force of scientists, engineers, managers, and support staff and to ensure that they have the tools and equipment they will need to achieve ORD's vision and goals.

Part B

ORD's Long-Term Goals and Objectives

The Agency must improve the scientific data and analytical methodologies needed to make sound decisions; to set risk-based priorities for protecting health and the environment; to support a new emphasis on protecting the health of the nation's ecosystems (such as forests, lakes, and wetlands); and to contribute to international environmental efforts.

*The Expert Panel on the Role of Science at EPA
Safeguarding the Future: Making Science Credible Decisions*

To help focus selection of research priorities, ORD has defined a set of long-term research objectives within each of the six broad ORD goal areas listed in Table 3. Variations in the specificity of the objectives listed below reflect differences in the maturity and complexity of the science underlying each objective. Many of the objectives include a set of activities (listed under the objective) that ORD intends to undertake to achieve the objective given sufficient resources. This detail allows ORD's internal and external stakeholders to understand specifically how ORD plans to accomplish its objectives.

Designed to be robust and stable, the goals and research objectives described here will guide decisions about research directions for years to come. Each year, ORD's Research Coordination Teams (see Appendix C) will apply ORD's priority-setting process (described in Part A) to review and identify specific research topics that best further these objectives. The resulting set of research topics will constitute the basis for ORD's research program. Appendix A describes

the first set of near-term priority research topics that resulted from applying this process.

Goal 1: To Develop Scientifically Sound Approaches to Assessing and Characterizing Risk to Human Health and the Environment

Risk assessments and the associated risk management decisions are often based on limited data obtained in species or under exposure conditions that differ from real-world circumstances. Inevitably, scientists must extrapolate from these data sets to the human or environmental setting of concern to characterize human health or ecological risks. Extrapolation injects uncertainty into risk characterizations, which EPA relies on to develop risk management strategies and research priorities.

Greater certainty in risk assessment would improve the efficiency and effectiveness of EPA's risk management efforts and provide a better foundation

ORD's Long-Term Goals and Objectives

for establishing the Agency's research priorities. ORD, therefore, will work to improve existing risk assessment data, methods, and models and to develop new methods for high-risk areas where data currently are inadequate. Already, for example, the science has advanced sufficiently to warrant more refined approaches to risk assessment in several areas, including ecological impacts, effects on vulnerable subpopulations of people or environmental species, and noncancer effects in humans. As ORD develops improved methods, we will work with other parts of the Agency to ensure that these methods are credible and used in ways that are scientifically sound.

In recent years, we have begun to recognize the interdependence of ecosystems and to understand that we must consider the landscape as a whole to maintain the integrity of vital ecosystems into the next century. While continuing to develop and refine scientifically sound approaches to assessing risks to human health, we intend to expand our ecological research. For example, we intend to study concurrent impacts of multiple anthropogenic and natural stressors and to develop techniques to examine nonchemical stressors. The results of this research—including enhanced data on and understanding of ecosystems at multiple levels of organization and geographic and temporal scales—will provide a scientific foundation for developing risk assessment/risk management strategies and techniques for restoring vital ecosystems (see Goal 3).

Objectives

Within this goal area, ORD will work to:

- Replace the current approach to assessing non-cancer health risks with more scientifically grounded, biologically plausible approaches and models. This will include:
 - Studying the heightened sensitivity/susceptibility of certain subpopulations (e.g., children).
 - Studying the predictive relationship between toxicologic endpoints and human disease (e.g., to facilitate animal-to-human extrapolation).
 - Developing integrated mechanistic information to support biologically credible health assessments.
- Develop methods and models founded on measurement data and sound theoretical concepts that can be used to better characterize, diagnose, and

predict total human exposures to chemical and microbial hazards, to improve and validate, exposure models, and to reduce uncertainties in exposure assessments, risk assessments, and risk management decisions. This will include:

- Determining the relationship between exposure sources and multiple exposure pathways, including characterizing the sources and determining the influence of transport, transformation, and fate on exposure.
- Developing and evaluating an integrated mass-balance/multimedia/multipathway exposure model that incorporates state-of-the-science pollutant fate and transport process descriptions for use in risk assessment.
- Developing and applying exposure measurement methods to reduce the uncertainty in exposure-dose relationships, especially analytical methods for identifying and enumerating microbial pathogens and biomarker and chemical marker methods for estimating site-specific exposures.
- Continuing activity pattern research to reduce uncertainty in models and assessments that predict exposure levels, frequencies, and distributions in populations.
- Delineating and quantifying the role of exposure in the development of effects in individuals and populations, including susceptible populations.
- Establish approaches to characterizing and understanding risks to ecosystems and, in cooperation with other agencies, develop a national, multi-scale, integrated environmental status and trends program. This will include:
 - Developing indicators of the condition of representative ecosystems.
 - Supporting hypothesis-driven, long-term monitoring of important exposure and effects indicators at national reference sites.
 - Characterizing national land-cover/land-use patterns and developing measures of landscape condition at multiple scales for specific sites, watersheds, landscapes, and ecoregions.
 - Conducting pilot studies in ecologically important regions (e.g., the mid-Atlantic Highlands) to evaluate alternative monitoring designs and to develop techniques to integrate data across geographic scales.

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- Understand and predict ecosystem exposures, responses, and vulnerabilities to high-risk chemical and nonchemical stressors at multiple levels of biological organization and geographic scales. This will require:

- Developing ecological criteria for water (both freshwater and marine), air, soil, and sediment quality (1) as needed for the Agency's risk assessment and risk reduction efforts, and (2) to measure progress toward meeting environmental goals.
- Developing diagnostic tools at all levels of biological organization for retrospective assessments and for characterizing the key sources and stressors in multistressed ecosystems.
- Developing tools for predicting the vulnerability of ecosystems at multiple geographic and temporal scales to ecosystem stressors (e.g., climate change, altered land use, changes in air, soil, or water quality).

Goal 2: To Integrate Human Health and Ecological Assessment Methods Into a Comprehensive Multimedia Assessment Methodology

Human health risk assessments and ecological risk assessments have different histories at EPA and have traditionally been thought of as involving different disciplines. As a result, EPA has developed and used separate methodologies for those assessments. As we have begun to take a more integrated view of risk, however, we have noted that human health and ecological risk assessments actually make use of similar types of data and science. We have realized that we must use a more integrated, multimedia approach to risk assessment if we are to understand and reduce many current and future risks. We will therefore conduct research to develop an accessible, seamless, common methodology for combined human health and ecological risk assessments so that we can provide decision-makers at all levels with the integrated view of risk that they need to make sound decisions.

Objectives

Within this goal area, ORD will work to:

- Integrate fate and transport modeling techniques with biologically based models needed in human health and ecological risk assessment.
- Integrate human health and ecological exposure and trends monitoring research.
- Better understand the relationship between human health and the condition of ecosystems (e.g., to assess the impact of human consumption of contaminated fish or wildlife or the influence of landscape characteristics and climate interactions on disease vectors such as mosquitos, ticks, and rodents).
- Develop tools and techniques to facilitate the assessment of relative risks to human health and the environment.
- Harmonize extrapolation methodologies for relating data on toxicity mechanisms for endocrine disruptors, immunotoxins, developmental hazards, and other chemicals with effects in sensitive human subpopulations, wildlife, and aquatic organisms.
- Improve extrapolation models by integrating toxicologic and mechanistic data obtained in laboratory and field investigations (epidemiology and ecology).
- Identify and validate wildlife species as sentinels for human health risks.

Goal 3: To Provide Common Sense, Cost-Effective Approaches for Preventing and Managing Risks

To enhance the practicality and cost-effectiveness of the products of ORD's risk management research, we are changing the way we study pollution control and prevention, contaminated site and spill remediation, and technology development. To the extent possible, we are integrating our air, water, and waste-related research, and we are increasingly focusing on emerging, high-risk problems—all so that we can better help regions, communities, and the private sector analyze pollution problems and achieve risk reductions efficiently and cost-effectively. This common sense approach will seek to maximize the health and environmental benefits of risk management by focusing risk management

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research on those aspects of a process or situation that cause the greatest risks.

To that end, our pollution prevention and control research will now focus on multimedia life-cycle analyses, "green" technologies, and pollution prevention methods that small- and medium-sized companies can use to achieve significant reductions in risk across media. Our maturing site and spill remediation program will concentrate on developing cleanup options for complex risk situations and faster, lower cost natural recovery systems. In addition, we will continue forging partnerships with the private sector to analyze high-risk needs and to develop, evaluate, and verify new pollution prevention and risk reduction technologies.

We have also begun efforts in ecosystem restoration and cost-benefit assessment. Our ecosystem restoration research (connected to that described under Goal 1 above) will focus on developing and demonstrating principles, technologies, and guidance materials that regions and communities can use to help restore local ecosystems. Our cost-benefit assessment research will focus on developing a systematic approach to identifying and reporting the benefits and costs of risk management technologies and alternatives. Such an approach is needed to satisfy the rapidly growing demand for cost-benefit analyses to support environmental decision-making—a demand engendered by the rising cost of environmental protection in an era of limited resources.

Objectives

Within this goal area, ORD will work to:

- Provide cost-effective risk management technologies and approaches for high-risk threats to human health and the environment. This will include:
 - Characterizing sources of fine-particulate emissions, air toxics, and ozone precursors, and identifying, adapting, and developing risk management approaches that control emissions to acceptable levels.
 - Providing cost-effective, reliable technologies and management approaches that reduce drinking water exposures to disinfectant byproducts while protecting water supplies from microbial contamination.
 - Providing communities with proven technologies for wet weather flow watershed management, wellhead protection, and restoration of contaminated areas.
- Provide pollution prevention approaches and analytical tools to the private sector. This will include:
 - Providing risk-based systems and tools to analyze options for multimedia pollution prevention for major industrial sectors.
 - Identifying and evaluating the performance and costs for pollution prevention options for small- and medium-sized businesses.
- Develop advanced air quality simulation models that relate sources, emissions, and receptors. This will include:
 - Developing models based on high-performance computing systems to predict the fate of pollutants through the multimedia pathways leading to human and ecosystem exposure to these pollutants.
- Catalyze the development and use of cost-effective risk management approaches for the most difficult and costly environmental management problems. This will include:
 - Developing cost-effective techniques for remediating soils and ground water contaminated with non-aqueous-phase liquids, chlorinated and other hazardous organics, and toxic metals.
 - Developing cost-effective techniques for remediating contaminated sediments.
 - Verifying the performance of innovative risk reduction technologies and accelerating their commercial use.
- Provide cost-estimating/engineering assessment tools and methods for more accurate and meaningful cost-benefit analyses. This will include:
 - Developing data standards and cost reporting protocols.
 - Developing methods and cost analyses for emerging, high-risk environmental problems (e.g., fine particulates, drinking water, wet weather flow controls).
- Develop and provide risk management alternatives to maintain and/or restore ecosystems. This will include:

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- Developing diagnostic and characterization methods and protocols for use in determining appropriate ecosystem restoration goals and requirements for specific sites, watersheds, landscapes, and ecoregions.
- Identifying, testing, and providing risk management approaches and technical guidance for restoring riparian zones, remediating contaminated soils and sediments, and applying best management practices to restore or maintain ecosystems in urban, suburban, and urbanizing areas.
- Developing methods to restore and maintain soil ecosystems.

Goal 4: To Provide Credible, State-of-the-Science Risk Assessments, Methods, Models, and Guidance

ORD continues to be a national leader in the field of risk analysis of human health and ecological effects and will continue to serve as a catalyst for advances in the science of risk assessment. ORD will achieve this goal by working to facilitate cooperation and the exchange of ideas between and among federal, state, and local scientists as well as scientists in the environmental, industrial, and academic communities. In addition, ORD will focus on three primary activities:

- Using an open and participatory process, ORD will conduct timely, state-of-the-art risk assessments. These assessments either will serve as prototypes demonstrating new approaches to risk assessment or will respond to Agency needs by assessing multimedia, multiprogram, or contentious or sensitive issues.
- ORD will support other risk assessment efforts by providing guidance, consultation, training, and information products to assist colleagues, both inside and outside EPA, in conducting their own risk assessments. These efforts will respond directly to the needs of the risk assessment community and will target areas of uncertainty in the science and conduct of risk assessment.
- ORD will improve the state-of-the-science of risk assessment by developing scientifically sound and defensible approaches for incorporating and integrating data and models developed by ORD and the general scientific community into risk assessment efforts.

ORD will integrate human health and ecological concerns into all these activities.

Objectives

Within this goal area, ORD will work to:

- Prepare risk assessments for those stressors currently considered of high risk to humans and the environment. This will include:
 - Assessing ubiquitous pollutants in the air that affect human health (e.g., fine particles, ozone).
 - Assessing the risks associated with highly toxic and persistent environmental contaminants (e.g., dioxin, mercury).
 - Assessing the risks to ecosystems from non-chemical stressors (e.g., habitat loss and habitat fragmentation).
 - Conducting comparative risk assessment of competing risks (e.g., those posed by microorganisms in drinking water versus those posed by disinfection byproducts).
- Complete development of new cancer risk guidelines and other guidelines and provide support to the program offices and regions to facilitate their implementation. This will include:
 - Developing and supporting the implementation of guidelines for assessing the ecological impacts of environmental stressors.
 - Supporting the implementation of new guidelines for cancer, neurotoxicity, and reproductive risks.
- Provide expert advice and technical support to EPA staff, other agencies, and EPA stakeholders. This effort will include:
 - Integrating scientific and technical information from ORD laboratories and other sources to provide a sound scientific base and technical support for Agency decisions and policy.
 - Developing and supporting the implementation of guidelines for assessing the ecological impacts of environmental stressors.
 - Supporting the implementation of new guidelines for cancer, neurotoxicity, and reproductive risks.
 - Supporting chemical- and site-specific risk assessments for criteria air pollutants, hazardous air pollutants, waste sites, and drinking water.

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- Providing training in risk assessment to state and local stakeholders.
- Continuing to support and improve the Integrated Risk Information System (IRIS) and expert systems such as Risk Assistant.
- Develop methods and assess methods developed by others for providing quality-assured data for environmental assessment. This will include:
 - Supporting the development of models that can be readily used by regions and states.

Goal 5: To Provide Reliable Scientific, Engineering, and Risk Assessment/Risk Management Information to Private and Public Stakeholders

Effective risk assessments and risk management decisions depend on the availability of accurate sources of scientific and engineering data and information, risk assessments, analytical methods, and guidance. As a leader in the development of such methods and information, we are committed to providing expertise and information to decision-makers inside and outside EPA. We will work to identify and fulfill user needs by providing appropriate tools and information through interconnected communication and technical support networks.

Our goal is to provide information that is impartial, up-to-date, and relevant to user needs. To that end, we must improve and update existing information systems and develop new systems and information transfer solutions to meet future needs. Working with other EPA offices, we will help to develop an operational communication and information transfer system for on-line scientific, engineering, and risk information that can be accessed by professionals or by members of the public who are involved in community-level analysis and decision-making.

Objectives

Within this goal area, ORD will work to:

- Provide current and relevant technical information to a broad user community. This will include:
 - Developing plain-language guidance and training that adequately and clearly communicate the appropriate use of technical

information and that describe limitations and inappropriate applications.

- Developing electronic communication and other information dissemination systems that can be accessed and understood by broad and diverse user communities.
- Complete the development of the new cancer risk guidelines and provide support to the program offices and regions to facilitate their implementation.
- Maintain and increase support for existing scientific, engineering, and risk information resource systems. This will include:
 - Ensuring that current information resources are accurate, relevant, and up-to-date.
 - Developing electronic and other methods of bringing databases (e.g., IRIS, ECOTOX) to state and local governments and other stakeholders.

Goal 6: To Provide National Leadership and Encourage Others To Participate in Identifying Emerging Environmental Issues, Characterizing the Risks Associated With These Issues, and Developing Ways of Preventing or Reducing These Risks

With our very broad missions, we in ORD and the Agency as a whole must have some means of evaluating, comparing, and setting priorities for competing needs. We use risk as the common denominator for comparing divergent issues and making decisions. Our focus on relative risks and risk-based decision-making demands that we look beyond the obvious problems of yesterday and today to identify and assess issues just over the horizon; we must determine the potential risks that these issues pose and work to solve them. Often, however, few data exist to support assessments of emerging issues. Thus, we must develop and disseminate data and methods to permit credible decision-making in the face of very high uncertainty. At ORD, we are committed to working with other groups within EPA, the Agency's Science Advisory Board (SAB), the National Academies of Science and

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Engineering (NAS and NAE), and others to develop new ways of analyzing emerging issues.

EPA's general approach to environmental management—assessing risks, evaluating the potential benefits of risk reduction, and devising risk management and risk reduction strategies accordingly—is increasingly being adopted by others in this country and abroad. More than any other organization, ORD has been in the forefront of developing the risk assessment and risk management methods that undergird this risk-based approach to environmental management. More than any other organization, therefore, we are in a position to provide leadership in the development of new, more credible ways of comparing and ranking risks. In providing this leadership, we renew our commitment to encouraging and enabling others in the public and private sectors to participate in identifying, characterizing, and resolving emerging environmental issues.

Objectives

Within this goal area, ORD will work to:

- Collaborate with other parts of the Agency, the SAB, the NAS, and others to develop methods of identifying emerging issues and assessing their potential risks.
- Develop partnerships (via research grants and other mechanisms) with other federal agencies, the White House Committee on Environment and Natural Resources, industry, and academia.
- Provide national and international leadership in risk assessment and its application for risk reduction and risk management.
- Conduct/sponsor workshops and symposia that will provide forums for stimulating interest and discussion on current or emerging environmental issues, reaching consensus on crucial research needs, and defining the role of ORD and others in addressing those needs.

Appendix A

ORD's Near-Term Research Priorities

The goals and objectives listed in Part B define an ambitious research program for ORD. Within this program, however, the extent of research that ORD can actually perform will be limited by the available resources. Therefore, ORD uses the priority-setting process (described in Part A) to select from its overall program those topics that are of highest priority for research. Applying its priority-setting process for the first time, ORD has established its research priorities for the next few years. The six highest priority topic areas are (in no particular order):

- Drinking water disinfection.
- Particulate matter.
- Human health protection.
- Ecosystem protection.
- Endocrine disruptors.
- Pollution prevention and new technologies.

Proposed research for these areas is summarized in Table A-1. Tables A-2 through A-7 provide a detailed breakout, by risk assessment/risk management area, of the strategic issues and proposed research tasks, products, and applications in each of the six topic areas. ORD's research agenda also includes additional topics necessary to help the Agency fulfill its nondiscretionary mandates. ORD's entire research program will be captured in the research plans that will be developed by the Research Coordination Teams (see Appendix C).

The following three examples illustrate how application of the selection criteria described in Part A gave rise to the high-priority research topics described in this appendix.

Drinking Water Disinfection

Although disinfection of drinking water has been one of the greatest public health success stories of the twentieth century, some public health concerns still remain. For example, hundreds of people have died and many thousands of hundreds have become ill during recent outbreaks of exposure to the bacterium *Cryptosporidium* in drinking water. Recent studies demonstrate that there is a low threshold of infectivity for *Cryptosporidium* and that people with compromised immune systems—such as the elderly, HIV-positive individuals, and persons receiving chemotherapy—may be at greater risk. In addition, other microorganisms exist in drinking water that may also have serious adverse effects. There still is a high degree of uncertainty about how to measure microorganisms in water and what their infectivity level is. Additionally, there is a high degree of uncertainty about whether disinfection byproducts—the chemical byproducts that result when disinfectants react with organic matter in drinking water—pose a significant human health threat. Because of the high uncertainty, the widespread human exposure to drinking water, the severity of the known effects from certain microbes, and the potentially high costs of further regulation of drinking water, this issue is of high priority to EPA's Office of Water and to ORD's research agenda.

Particulate Matter

Recent publications in the scientific literature indicate that exposure to particulate matter poses a high potential human health risk. At the same time, however, there is a high degree of uncertainty about the size and composition of the particles that may be

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responsible for these effects, the biological mechanisms of action, and the dose-response relationships at low levels of exposure. In addition, *control costs are potentially very high*. For all these reasons, this area is of high priority to EPA's Office of Air and Radiation and of high priority for ORD's research agenda.

Ecosystem Protection

Many ecological effects are potentially related to pollution and other environmental factors. The

consensus among environmental scientists and decision-makers is that methods are needed to assess ecological risks. Such methods would serve all EPA programs and are extremely important for understanding risks at both the local and community levels. Because of the *broad applicability* of these methods and their *significant potential for improving ecological risk assessment and risk management*, ORD has selected ecosystem protection as a high-priority topic for its research agenda.

Table A-1. Summary of EPA/ORD Research Program for Six High-Priority Research Topics

Research Topics	Strategic Focus	Tasks	Products	Uses
Drinking Water Disinfection	What is the comparative risk between waterborne microbial disease and the disinfection byproducts (DBPs) formed during drinking water disinfection? How can both be simultaneously controlled?	Develop methods for measuring pathogen/DBP exposure from drinking water; determine effects and dose-response for them; develop/apply a microbial risk assessment framework; improve DBP risk assessments; and evaluate alternative treatment processes for DBP/microbial control.	Data on effects, dose-response, exposure, comparative risk, and treatment for pathogens/DBPs.	To support DBP/microbial risk assessment/risk reduction rulemaking and compliance monitoring.
Particulate Matter	What morbidity/mortality is associated with low ambient levels of particulate matter (PM), and what cost-effective methods are available to reduce PM emissions to an acceptable level?	Conduct clinical/epidemiology studies of PM effects; reanalyze past epidemiology studies; conduct pharmacokinetic and biological studies; characterize the size/species of PM; conduct a human exposure study; and evaluate, develop, and demonstrate technologies to reduce PM emissions.	Morbidity/mortality, dose-response, and mechanistic data; descriptive model, methods for measuring PM mass/species; improved human exposure estimates; data on emissions composition; improved risk estimates; and data on cost-effectiveness of PM control strategies.	To improve criteria documents and risk assessments in support of PM National Ambient Air Quality Standards review; to provide information for evaluating alternative PM control strategies.
Human Health Protection	How can we better define/predict hazards, improve dose extrapolation, and better understand mixture toxicity? What is the population distribution of total exposure? What are the source-exposure-dose relationships?	Develop or improve methods for screening hazard data; collecting toxicity data, and interpreting hazard data; develop models to estimate target tissue dose and responses to these doses; and develop methods/models for assessing mixtures toxicity. Determine how exposure is influenced by age, lifestyle, behavior, and socioeconomic factors. Develop total human exposure models, which include source/pathway contributions to total exposure.	Hazard screening/testing protocols; models for predicting chemical disposition in the body, and test protocols/models for mixtures toxicity. Improved exposure measurement and assessment methods, models, and data.	To rank/screen chemicals; develop test guidelines; provide guidance for risk assessment; and identify mixtures toxicity. To support exposure assessment during risk-based decision making.

(Continued)

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Table A-1. Summary of EPA/ORD Research Program for Six High-Priority Research Topics (Continued)

Research Topics	Strategic Focus	Tasks	Products	Uses
Ecosystem Protection	How can we determine ecosystem risk and capacity to tolerate stress? What are the chemical and nonchemical exposures to the most sensitive systems? Which ecosystems are vulnerable? Where? How can we reduce risk in a cost-effective manner?	Study ecosystem vulnerability and stressor-response relationships; identify eco-effect measures; characterize habitat distribution and chemical exposures; develop/apply eco-risk assessment methods; and study eco-risk reduction	Ecosystem criteria, models to predict ecosystem effects-/risks, national land-cover map, baseline data for documenting future changes, ecosystem exposure profiles, and information on risk reduction approaches for ecosystems.	To inform the debate on ecosystem protection, ecosystem assessment, environmental planning, and ecosystem risk reduction/restoration
Endocrine Disruptors	What is known about endocrine disruptor (EDC) exposure, human/eco-effects, and risk assessment? What research still needs to be done?	Review existing literature on EDCs, conduct workshops on research needs, develop QSAR/PBPK/BBDK ^a methods/models, conduct field measurements of EDCs, and assess effects on highly exposed cohorts.	Reports on research needs, analytical methods, risk assessment methods, data from field measurements, and cause-effect data	To prioritize research needs, review test guidelines, and conduct hazard/effect and preliminary exposure/risk assessments
Pollution Prevention and New Technology	How can pollution prevention be integrated into environmental decision-making?	Study engineering/performance costs for pollution prevention; develop technologies; identify audiences needing technical assistance; develop life-cycle analysis/audit tools; and assist in disseminating technologies to the commercial sector.	Pollution prevention cost accounting protocols, cost data, technology transfer products, life-cycle analysis tools, audit procedures, pollution prevention technologies, and performance data	To evaluate and implement pollution prevention approaches

^aQSAR = quantitative structure-activity relationships.

PBPK = physiologically based pharmacokinetic

BBDK = biologically based dose-response

Table A-2. Drinking Water Disinfection

Subtopic	Strategic Focus	Tasks	Products	Initial Uses	Future Uses
Health Effects	What dose levels of pathogens cause illness in exposed populations?	Conduct dose-response studies on waterborne pathogens.	Data for risk assessment models to predict disease incidence	To provide health effects data for risk assessment to support upcoming surface water and ground-water treatment rules	
	What are endemic and epidemic illness rates for waterborne microbial disease?	Conduct epidemiology studies for pathogen-caused disease.	Indication of magnitude of risks and verification of risk models	To provide health effects data for risk assessment to support upcoming surface water and ground water treatment rules	
	What are the relative risks of disinfection byproducts (DBPs) from different disinfection processes?	Conduct epidemiology studies on reproductive/developmental effects and, if feasible, on cancer Conduct toxicity studies on individual DBPs and mixtures if feasible.	Qualitative/quantitative data on cancer, reproductive effects, and other effects Risk assessments for individual DBPs	To assess the risks of different disinfection processes, combining epidemiology, toxicity, and mixtures information, to support DBP rules.	
Exposure	What levels of pathogens are people exposed to?	Develop analytical methods that detect viable/infective organisms Identify sources of pathogens and factors affecting occurrence levels in surface and ground waters.	Practical analytical methods for pathogens Analyses of pathogen occurrence in source waters Information on pathogen exposures in drinking water	As a survey tool for developing occurrence data To support exposure assessments to predict pathogen occurrence in drinking water under different treatment processes	To provide methods for compliance by water utilities
	What levels of DBPs are people exposed to?	Develop methods for measuring occurrence of DBPs in drinking water. Study the level of DBPs in drinking water supplies.	Improved practical field and research methods for DBPs in drinking water Identity of new DBPs under different disinfection practices Data on DBP exposure from drinking water	To support exposure assessments for DBPs from different treatment processes	To provide methods for compliance by water utilities

(Continued)

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Table A-2. Drinking Water Disinfection (Continued)

Subtopic	Strategic Focus	Tasks	Products	Initial Uses	Future Uses
Risk Assessment	What are the comparative risks from DBPs and microbes?	Develop appropriate risk assessment paradigm for microbes, including dose-response models	Improved risk assessment procedures and risk estimates for microbes	To provide a comparative risk framework for risk assessments for surface water treatment rules and DBP rules	
		Apply advances in cancer and noncancer risk assessment to individual DBPs and mixtures of DBPs.	Improved risk assessment procedures and risk estimates for DBPs		
Risk Management	Which technologies can simultaneously control pathogens and DBPs?	Evaluate treatment processes for pathogen control, including identification of surrogate measures of treatment effectiveness, technologies for small systems, and control of bacterial growth in distribution systems.	Data on the effectiveness of different processes.	To evaluate different treatment options and regulatory strategies for reducing DBP and microbial risks	To provide guidance for operation of treatment plants and distribution systems
		Simultaneously evaluate processes for controlling DBPs (including chlorine vs. alternative disinfectants) and practices for removing DBP precursors (granular activated carbon, membrane filtration).			

Table A-3. Particulate Matter

Subtopic	Strategic Focus	Tasks	Products	Initial Uses	Future Uses
Health Effects	What health effects are caused by particulate matter (PM) and its components?	Conduct epidemiologic studies of mortality and morbidity coupled with improved exposure characterization.	Qualitative and quantitative data on mortality and/or respiratory diseases	To provide health effects data for risk assessment (Criteria Document) to support PM National Ambient Air Quality Standards (NAAQS)	To provide health effects data for further risk assessment (updated Criteria Documents) to support PM NAAQS
		Conduct clinical studies of respiratory effects in controlled human studies.			
		Conduct animal and clinical studies of biochemical and physiologic events initiated by PM and its components	Dose-response data describing biochemical and physiologic events induced by PM and their relationship to disease.	To provide health effects data for risk assessment (Criteria Document) to support PM NAAQS	To provide health effects data for further risk assessment (updated Criteria Documents) to support PM NAAQS
Exposure	What is the relationship between PM exposure and dose? What is the role of dose for effects in sensitive subpopulations?	Develop dosimetric model of particle deposition in the lungs under various exposure and population conditions.	Dosimetric model linking animals to humans and normal humans to sensitive subpopulations (e.g., children, individuals with preexisting disease)	To provide health effects data for risk assessment (Criteria Document) to support PM NAAQS	To provide health effects data for further risk assessment (updated Criteria Documents) to support PM NAAQS
		Develop ambient PM measurement methodology capable of discriminating particles by size and species	Methods for measuring fine-particle mass and characterizing species (e.g., acid aerosols, inorganic and organic species)	To serve as a Federal Reference Method for new fine-particle NAAQS	To provide PM methodology for atmospheric chemistry research and total exposure research
		What PM species and concentration levels are present in ambient air?	Conduct PM size and species characterization studies	To assess PM size and concentration levels for regulatory development and epidemiologic study design	To identify sources of PM and address PM information, transport, and fate To help develop control strategies for implementing PM regulation(s)

(Continued)

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Table A-3. Particulate Matter (Continued)

Subtopic	Strategic Focus	Tasks	Products	Initial Uses	Future Uses
Exposure (Continued)	What PM species and concentration levels are people exposed to?	Conduct prospective epidemiologic and human exposure studies	Verification of current epidemiologic observations Improved estimates of human exposure to PM Reduced uncertainty regarding the size and physical properties of PM that may cause health effects	To determine the effects of ambient fine and coarse PM on adults' lung function and daily mortality	To evaluate and extend findings on size-specific PM exposure and daily mortality
Risk Assessment	How can we reduce uncertainties associated with estimates of the PM mortality/morbidity risks at low ambient levels?	Conduct statistical reanalyses of existing epidemiologic databases to further characterize: -The shape of exposure-response relationships (possible 'thresholds') -The influence of synoptic weather patterns -The size/chemical composition of key PM components	Quantitative data analyses providing reduced uncertainties in PM risk estimates	To provide health effects data for risk assessment (Criteria Document) to support PM NAAQS	To provide health effects data for further risk assessments (Criteria Documents) to support PM NAAQS
Risk Management	What are the emission rates and physical and chemical characteristics of fine particles from sources that pose the greatest risk to public health?	Characterize fine-particle emissions from sources of concern (e.g., heavy-duty diesel trucks, fugitive sources, combustion systems, other stationary sources).	Technical reports and data on the size distribution, chemical composition, and quantity of fine-particle emissions from key mobile and stationary sources.	To provide emissions data to focus regulatory strategies on the most critical sources	To provide methods and models for states to develop fine-particle emissions inventories

(Continued)

Table A-3. Particulate Matter (Continued)

Subtopic	Strategic Focus	Tasks	Products	Initial Uses	Future Uses
Risk Management (Continued)	What options (e.g., process changes, upgrades of existing controls, application of new technologies) are available that both reduce fine-particle emissions to acceptable levels and are cost-effective?	Investigate options for reducing fine-particle emissions. - Demonstrate the extent to which improved operation and maintenance of existing control equipment for combustion systems can further reduce emissions. - Develop advanced, more cost-effective technologies (e.g., improved electrostatic precipitators and fabric filters) to control fine particles from stationary sources. - Determine the effectiveness of indoor air cleaners for reducing personal exposure to fine particles. Compare the costs of these and other approaches.	Technical reports and data on the performance of and cost-effectiveness of competing risk management approaches. User-friendly computer models and other technical assistance tools that transfer risk management information to key users.	To support evaluations of competing regulatory strategies, cost/benefit analyses, and development of guidance documents.	To provide guidance to states and the regulated community on the performance and cost of competing fine-particle risk management approaches.

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Table A-4. Human Health Protection

Subtopic	Strategic Focus	Tasks	Products	Initial Uses	Future Uses
Exposure	What is the source-exposure relationship?	Develop verified models that trace the prospective and retrospective relationship between sources and total exposure.	Verified source-exposure models that incorporate fate and transport processes.	To identify the most effective risk management targets	Similar to initial use, but expanded to be more broadly applicable
	What is the population distribution of exposures from all media?	Develop quantitative total human exposure models based on sound theoretical and experimental information	Improved methods for exposure measurements - Activity pattern database. - Microenvironmental exposure measurements. - Field studies of populations with a variety of exposure risk factors. - Computer-based exposure model platform	To support health risk assessments, to measure effectiveness of risk management decisions	Similar to initial use, but expanded to be more broadly applicable.
Dose Estimation	What are the determinants of exposure?	Determine which behavioral, socioeconomic, or lifestyle factors increase exposure to pollutants, determine the relationship of age (young and old) and preexisting disease to exposure.	Multimedia/pathway exposure data for disadvantaged populations, children, the elderly, and persons living near selected sources (e.g., pesticide use) Exposure models for highly exposed subpopulations.	To identify at-risk subpopulations for risk assessment and to ensure adequacy of rules/regulations	Similar to initial use, but expanded to be more broadly applicable
	What is the exposure-dose relationship for pollutants from each pathway?	For pollutants having multiple pathways, determine the quantitative contribution of each pathway to total exposure and target-site dose.	Models of relative intakes of persistent chemicals from inhalation, oral, and dermal routes based on measurement data.	To identify the pathways that contribute most to risk and hence require mitigation.	To improve risk assessments and enhance risk management decisions
	How can we improve dose estimations across species and exposure scenarios?	Develop methods and models for estimating dose to target tissues (i.e., physiologically based pharmacokinetic models).	Models for predicting disposition of chemicals in the body from all routes.	To improve the scientific basis for cancer and noncancer risk assessments	To reduce uncertainty in risk assessment and risk management decisions

(Continued)

Table A-4. Human Health Protection (Continued)

Subtopic	Strategic Focus	Tasks	Products	Initial Uses	Future Uses
Hazard Identification and Characterization	How can we improve our ability to detect hazards?	Develop screening methods to set testing priorities.	Validated screening protocols using, for example, <i>in vivo</i> , <i>in vitro</i> , and structural activity relationship (SAR) methods	To identify and rank existing pesticides and industrial chemicals in terms of potential toxicity	To screen new chemicals as they enter the regulatory system, to assess relative toxicity
		Develop cost-effective methods for toxicity data collection.	New and revised standard toxicity testing protocols	To develop Agency test guidelines	To support regulatory activities (e.g., FSC, ^a test rules and consent agreements, HRA ^b data call-ins)
	How can we better interpret toxicity data to predict and define hazards?	Develop improved methods for data interpretation. For example, identify biomarkers of exposure and effect and validate the use of biomarkers in human populations.	Guidance document on interpretation of toxicity data	For incorporation into risk assessment guidelines.	To improve health risk assessments in support of risk management decisions
Dose-Response Relationship	How can we reduce uncertainty in extrapolations (e.g., from high doses in animals to environmental exposures in humans)?	Develop quantitative models for predicting tissue and organism response to target tissue dose (i.e., biologically based dose-response models)	Models for predicting toxicity due to chemical exposures, which can be modified and applied in chemical-specific risk assessments.	To provide critical examples of development and use of mechanistic models, to evaluate the potential of these models for replacing default approaches for cancer and noncancer risk assessment	To provide a state-of-the-science basis for replacing default, primarily empirical risk assessment approaches
		Develop improved empirical dose-response models (e.g., benchmark dose models)	Validated benchmark dose models and guidelines for applications	To improve reference dose concentration procedures.	To improve the basis for risk management decisions
	What toxicities are associated with mixtures?	Develop methods to assess the toxicity of chemical mixtures.	Validated and standardized testing protocols.	To identify chemical mixtures with potential toxicity that is other than additive	To assess site-specific relative risk, to support pollution prevention and risk management decisions.
Special Problems		Develop models to predict the toxicity of chemical mixtures.	Validated and standardized predictive models.	To identify chemical mixtures likely to have synergistic or supra-additive toxic effects	To improve risk management decisions concerning risks posed by mixtures.

^aFSC—Toxic Substances Control Act^bHRA—Federal Insecticide, Fungicide, and Rodenticide Act

Appendix A

Table A-5. Ecosystem Protection

Subtopic	Strategic Focus	Tasks	Products	Initial Uses	Future Uses
Effects	What levels of anthropogenic stress (chemical and nonchemical) can ecosystems tolerate and still be sustained/maintained?	Understand and develop models to predict ecosystem vulnerability to alternative management practices and changing stressors at multiple scales	Quantitative models predicting complex and cascading effects of multiple stressors at multiple geographic and temporal scales Criteria for maintaining ecosystems	To inform debate on societal protection, to provide information to support future community-based ecosystem protection	To provide information to evaluate comparative risks and drive strategic research planning
		Develop screening and testing methods to assess viability and sustainability at multiple levels of biological organization			
	How do ecosystem components respond to changing exposures to stressors?	Conduct research to quantitatively understand stressor response relationships	Quantitative models relating levels of exposure to effects for single stressors	To support ecological effects assessment	To support ecological effects assessment
Exposure	What are the best measures of ecosystem effects?	Identify indicators (measures) of effect that correspond as closely as possible to assessment endpoints	Evaluation of indicators of effect	To provide indicators that can serve as state variables in risk assessment models and as measures of condition for status and trends monitoring	To support objective evaluation of success in risk management decision-making
	What are the most significant sources of stressors in various ecoregions of the United States?	Develop methods for characterizing sources of relevant stressors	Methods for characterizing sources of exposures	As tools for exposure assessments	As components of expert systems to predict exposure
	What is the extent and distribution of highly/vulnerable systems based on predicted changes in stressors at multiple scales?	Develop methods to efficiently characterize regional landscapes and habitat distribution	Baseline data for regional assessments Assessments of highly vulnerable ecosystems, within and among ecoregions A national land-cover map of the United States	To support relative risk assessments	To identify vulnerable systems at watershed and regional scales

(Continued)

Table A-5. Ecosystem Protection (Continued)

Subtopic	Strategic Focus	Tasks	Products	Initial Uses	Future Uses
Exposure (Continued)	What is the current distribution of exposure to these stressors across vulnerable ecosystems?	Develop models to link transport, transformation, and fate of stressors to exposure to ecosystems at appropriate time and space scales. Support an interagency exposure reference site network Conduct exposure vulnerability assessments at multiple geographic and temporal scales.	Methods for assessing exposure.	To support relative risk assessments	To identify vulnerable systems at watershed, regional and national scales
Assessment	What sources are now causing the most significant exposures? How will current patterns of exposure change in 5, 10, 25, and 50 years? Link landscape and pollutant models to predict future environments.	Develop diagnostic tools for retrospective assessments. Conduct demographic and economic studies to assist in predicting future sources of stressors. Predictive models for use by community-based ecosystem protection planners. Predictions of future pollutant and stressor distributions	Indicators of source/exposure relationships Documentation of highest priority stressors. Data for predictive models Predictive models for use by community-based ecosystem protection planners. Predictions of future pollutant and stressor distributions	To apportion source strengths To assist in avoiding the unintended consequences of our current management decisions To support environmental planning at multiple scales. Data for predictive models Predictive models for use by community-based ecosystem protection planners. Predictions of future pollutant and stressor distributions	To identify sources for risk reduction technology development To assist in avoiding the unintended consequences of our current management decisions To support environmental planning at multiple scales. Data for predictive models Predictive models for use by community-based ecosystem protection planners. Predictions of future pollutant and stressor distributions
Assessment	What are the assessment endpoints of primary concern to local, watershed, and regional communities?	Develop an ORD-wide ecological data management system	Data systems to support risk management	To support ecological risk assessment	To conduct comparative ecological risk assessments to prioritize research and ecological protection efforts

(Continued)

Table A-5. Ecosystem Protection (Continued)

Subtopic	Strategic Focus	Tasks	Products	Initial Uses	Future Uses
Assessment (Continued)	What are the comparative risks to populations, communities, and ecosystems from multiple stressors?	Develop risk assessment and characterization methods for single/multiple resources and stressors	Improved risk assessment methods	As tools for ecological risk assessment	To conduct comparative ecological risk assessments
		Assess the risks and their economic implications	Quantitative/qualitative regional, comparative risk assessments	To support regional and local community-based ecosystem protection plans	To assist in prioritizing research and ecological protection efforts
		Develop an expert system for assessing ecological benefits of alternative management strategies at multiple scales.	Links between human health and ecological risks	As a tool for environmental management at watershed scales	To assist in environmental management and planning at multiple scales.
Risk Management	What are the most cost effective and efficient ways to reduce risk to ecosystems?	Conduct comparative risk assessments			
		Identify and evaluate promising options for risk reduction	Risk management technologies for contaminants, sediments, hazardous wastes, and other stressors Data on technology effectiveness Recommendations on optimal ecosystem management approaches	As tools to select and implement approaches for reducing ecological risk	To avoid an ecological "train-wreck"
		How are degraded ecosystems best restored?	Conduct field restoration projects	Restoration techniques To improve restoration techniques	To restore ecosystems, to provide manuals and guidance on management practices

Table A-6. Endocrine Disruptors

Subtopic	Strategic Focus	Tasks	Products	Initial Uses	Future Use
Identity Research Needs	What do we know about the sources, chemical and physical properties, transport pathways, ecological and human effects of EDCs, ^a and where are the major gaps in our knowledge base?	Conduct workshops involving principal stakeholders in developing consensus on the research needs for exposure, risk, and health and environmental effects	Reports on the research needs for (1) reproductive, neurologic, immunologic, and carcinogenic effects of EDCs; (2) ecological risk, and (3) exposure assessment	To develop prioritized research needs.	
Effects	What are the important chemical classes for interaction with the endocrine system, and what is their range of potency? Do our current testing and monitoring approaches adequately evaluate and assess effects on the endocrine system?	Develop QSAR ^b models for hormone receptor-ligand binding and transcriptional activation. Develop <i>in vivo</i> and <i>in vitro</i> test procedures and biomarkers to detect the action of EDCs and to identify critical life stages at multiple phylogenetic levels	QSAR models to identify and prioritize <i>in vivo</i> research to define dose-response effects. Recommendations for modifying the testing guidelines for potential adverse ecological and human health effects and field and laboratory tools to better quantitate effects of putative EDCs.	As first-tier computer models to predict hazard	
	What are the shapes of the dose-response curves for EDCs at relevant exposures, and what tissue levels are responsible for inducing adverse effects?	Develop PBPK ^c and BBDR ^d models that include relevant species-specific parameters Define potency of EDCs in target species.	Increased understanding of the comparative exposure levels associated with risks Reduced uncertainty in extrapolating effects.	To reduce uncertainty in chemical-specific risk assessments and relative potency comparisons	
	What is the normal endocrine profile in target wildlife species on a seasonal and regional basis?	Study populations and determine normal profiles for endocrine function during various life stages, seasons, and regions	Database on endocrine function in wildlife exposed to potential EDCs.	To improve interpretation of endocrine data from field studies and to improve understanding of the magnitude of the EDC problem in wildlife populations	
	What are health outcomes experienced by populations receiving high-level exposure to EDCs?	Assess spectrum of effects in highly exposed cohorts, particularly those with developmental exposures.	Delineation of causes and effects that can set the bounds on effects in less highly exposed populations	To conduct preliminary risk assessments To develop remedial actions where adverse effects of EDCs in the environment have been confirmed	

(Continued)

Appendix A

Table A-6. Endocrine Disruptors (Continued)

Subtopic	Strategic Focus	Tasks	Products	Initial Uses	Future Use
Effects (Continued)	For wildlife species, what procedures are available for extrapolating effects of the individual to populations?	Develop models for extrapolating effects measured in individuals to reproductive capacity in wildlife populations.	Models for predicting population-level effects from study at lower levels of biological organization.	To facilitate ecological risk assessment based on effects observed in individuals.	
	What are the status and trends of sentinel and keystone species in the various ecological areas?	Identify and periodically conduct censusing of sentinel and keystone species.	Early warning indicators of environmental quality, especially in terms of contamination by EDCs.	For environmental monitoring.	
	What are the effects of exposure to multiple EDCs?	Determine potential for synergism or potentiation within and among various modes of action.	Assessment of the potential for non-additivity among EDC health endpoints.	To improve effects assessment for environmentally important multiple exposures to EDCs.	
	What are the pathways of exposure of EDCs?	Develop source-receptor models to assess exposure from specific sources via multimedia pathways.	Validated models to assess exposure to EDCs.	To improve source-receptor relationships determined via hybrid models.	
Exposure	Do we adequately understand multimedia transport (including phase equilibrium and deposition mechanisms), persistence, bioaccumulation, and biomagnification of EDCs?	Develop methods to monitor exposure to EDCs and methods to characterize exposure half-life, speciation, uptake, and phase equilibrium.	Analytical methods adequate to characterize EDCs in multimedia, to assess transport, fate, and exposure, and to provide input to source-receptor models.	To improve source and receptor models and assessments of EDC exposure.	
	Do we have adequate (sensitive, reliable, and inexpensive) tools to monitor populations for exposures to EDCs?	Develop biomarkers for exposure of EDCs applicable to the phylogenetic levels considered to be at greatest risk to EDCs.	Field and laboratory tools to better quantitate the exposures and effects of putative EDCs. Improved algorithms to calculate EDC exposure.	To improve data interpretation.	
	What are the environmental concentrations of EDCs in all principal media?	Conduct field studies to measure high-priority EDCs.	Database on EDC levels in the human environment and various ecosystems to assist in designing future exposure strategies.	Preliminary environmental exposure assessments.	

(Continued)

Table A-6. Endocrine Disruptors (Continued)

Subtopic	Strategic Focus	Tasks	Products	Initial Uses	Future Use
Exposure (Continued)	What exposures are experienced by populations affected by EDCs?	Quantitate exposure in populations showing effects of EDCs, particularly those with developmental exposures.	Delineation of causes and effects which can set the bounds on effects in less highly exposed populations.	To conduct preliminary risk assessments. To develop remedial actions to avert adverse effects of EDCs in the environment have been confirmed.	
Assessment	What strengths and weaknesses are present in assessment of existing information on EDCs and related topics?	Convene EPA working group to critically review existing biological effects information.	Report of literature review	To refine ORD's research strategy. To develop regulatory policy on EDCs.	

*EDC = endocrine-disrupting chemical.

*QSAR = quantitative structure-activity relationship.

*PBPK = physiologically based pharmacokinetic.

*BMDR = biologically based dose-response.

Appendix A

Table A-7. Pollution Prevention and New Technology

Subtopic	Strategic Focus	Tasks	Products	Initial Uses	Future Uses
Risk Management	How can pollution prevention strategies be integrated into federal, state, and private sector decision-making?	Develop life-cycle assessment (LCA) tools and models.	LCA tools that include health and ecological impacts	To demonstrate how LCA can evaluate options for multimedia pollution prevention and risk management that are keyed to the greatest risks.	As objective, scientifically credible LCA procedures for regulatory and private sector use
		Develop pollution prevention modules for industrial plant, product, and process design procedures.	Generic and specific LCA case studies with private and public sector partners Mathematical models and computer-based simulators for process design	To establish partnerships to demonstrate risk-based pollution prevention design and process simulation opportunities	For commercial plant and process design methods, models, and procedures To provide technology transfer to the private sectors through Cooperative Research and Development Agreements and licensing agreements
		Develop pollution prevention measurement and audit tools for small businesses	Pollution prevention accounting methods and models Audit procedures for pollution prevention.	As tools for measuring and estimating "pollution prevented" in small businesses.	To provide technical guidance for regulatory programs and private sector needs
		Develop precompetitive and enabling pollution prevention and innovative technologies for major industrial sectors.	Pollution prevention and innovative technologies for Common Sense Initiative-related industrial sectors and high-risk problems, including information on technology costs.	To improve technical and cost data and designs for pollution prevention and innovative technologies keyed on CSI industries and other high-risk needs	To provide a basis for commercially available pollution prevention and innovative technologies for a wide array of U.S. industrial sectors and high-risk problem areas
	How can pollution be prevented?	Evaluate and verify these technologies for technical performance and cost effectiveness.	Technology verification protocols, third-party verification organizations, and outreach to technology enablers and users. Performance and cost data for pollution prevention and innovative technologies	Enhanced and more credible information to inform decision-makers about pollution prevention and innovative technology options emphasizing both performance and cost	As a basis for developing scientifically credible and commercially available pollution prevention and innovative technologies for both U.S. and foreign markets

(Continued)

Table A-7. Pollution Prevention and New Technology (Continued)

Subtopic	Strategic Focus	Tasks	Products	Initial Uses	Future Uses
Risk Management (Continued)	How can reliable and appropriate cost data be generated for pollution prevention and innovative technologies?	Develop process cost models for pollution prevention and innovative technologies. Develop cost data reporting standards and protocols for improved cost comparability	Cost estimating and reporting protocols and standards.	To improve cost estimating tools for use in cost-effectiveness and cost-benefit methods development.	To provide reliable, scientifically credible cost-estimation packages for environmentally preferable approaches and technologies.
		Develop engineering and performance costs for pollution prevention and innovative technologies.	Cost data for pollution prevention and innovative technologies.	For cost-benefit assessments by EPA and other regulatory and nonregulatory decision-makers.	For cost-benefit assessments by EPA and other regulatory and nonregulatory decision-makers.
	How can pollution prevention and innovative technologies be disseminated to effect a reduction in environmental risk worldwide?	Identify specific industry and government audiences worldwide; their needs for information, and appropriate products to meet those needs (e.g., seminars, bulletins, demonstrations).	A variety of technology transfer products disseminated via the Internet, teleconferencing, electronic bulletin board, and other more conventional means (e.g., reports, workshops).	To increase the awareness and knowledge of environmental professionals and others about the validity and benefits of pollution prevention and innovative technologies, thereby leading to their increased application and broader use. To improve decision-making among innovative technology users and permitting officials.	To support widespread use of applicable pollution prevention and innovative technologies that maximize risk reduction.
			Industry-targeted information dissemination products that will include technical and cost data and performance analyses.	To improve environmental compliance and reduce compliance costs.	To encourage the private sector to value and routinely use pollution prevention and innovative technologies as the first or only preference for environmental protection and compliance.

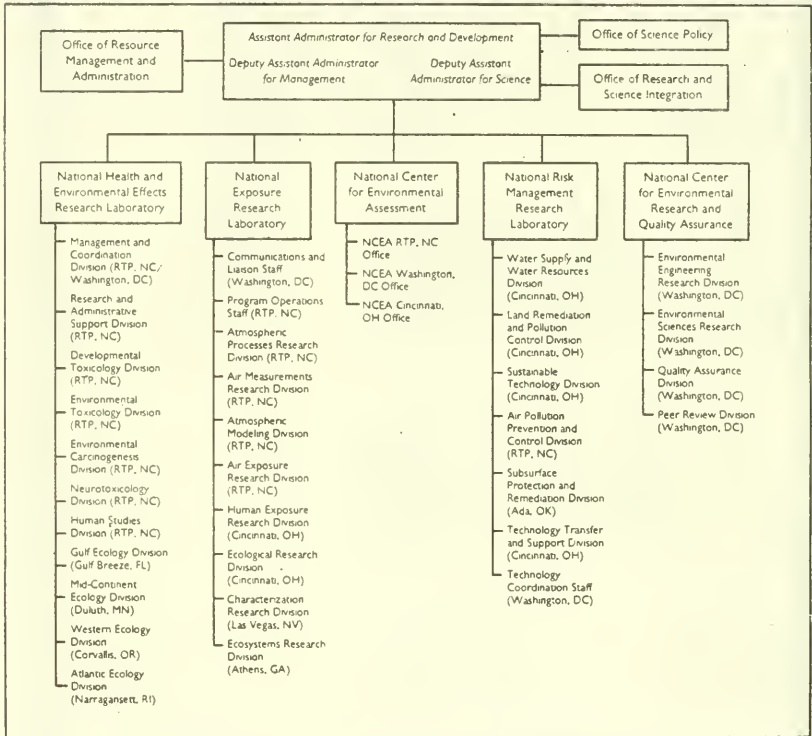
Appendix B

The ORD Organization

ORD's new organization, depicted below, mirrors the risk assessment/risk management paradigm:

- The *National Health and Environmental Effects Research Laboratory* investigates the potential effects of stressors on humans and ecosystems. This

ORD's New Risk-Based Organization



Appendix B

work provides the scientific basis for *hazard identification* and *dose-response assessment*.

- The **National Exposure Research Laboratory** measures and predicts the extent to which humans and ecological resources are exposed to pollutants and other stressors. This work provides the basis for *exposure assessment*.
- ORD's **National Center for Environmental Assessment** serves as a national resource center for the overall process of risk assessment: integrating hazard, dose-response, and exposure data and models to produce *risk characterizations*.
- ORD's **National Risk Management Research Laboratory** supports *risk management* by developing, evaluating, and disseminating effective tools

and approaches for preventing or reducing current and anticipated risks to human health and the environment

- ORD also has created a **National Center for Environmental Research and Quality Assurance** (NCERQA), which represents a major and renewed commitment by ORD to help EPA achieve the highest possible quality of science. NCERQA's main purpose is to direct ORD's newly expanded external grants and fellowship programs, which are designed to involve the nation's top scientists and engineers in research issues of importance to the Agency. NCERQA also provides managerial oversight of EPA quality assurance programs.

Appendix C

Management Structure for Implementing ORD's Strategic Plan

Successful implementation of ORD's Strategic Plan requires coordinated input and involvement by all ORD laboratories, centers, and offices as well as EPA's program and regional offices. Several councils and teams, illustrated and described below, provide mechanisms for this participation. Collectively, these groups involve all levels of ORD senior management from ORD's Assistant Administrator through to ORD's Assistant Laboratory Directors (see figure). The Research Coordination Council and ORD's Research Coordination Teams, described below, provide mechanisms for program and regional office involvement.

Executive Council

ORD's Executive Council is chaired by ORD's Assistant Administrator and consists of ORD's Deputy Assistant Administrators for Science and Management and the Directors of ORD's national laboratories, centers, and offices. The Executive Council serves as the primary decision-making body for major planning and management decisions. Based on input from the Management and Science Councils, Research Coordination Council, and Research Coordination Teams, the Executive Council coordinates major policy and budget issues across ORD, including consensus recommendations to ORD's Assistant Administrator.

Management Council

ORD's Management Council is chaired by ORD's Deputy Assistant Administrator for Management and includes the Deputy Assistant Administrator for Science as an ex officio member, the Director of ORD's

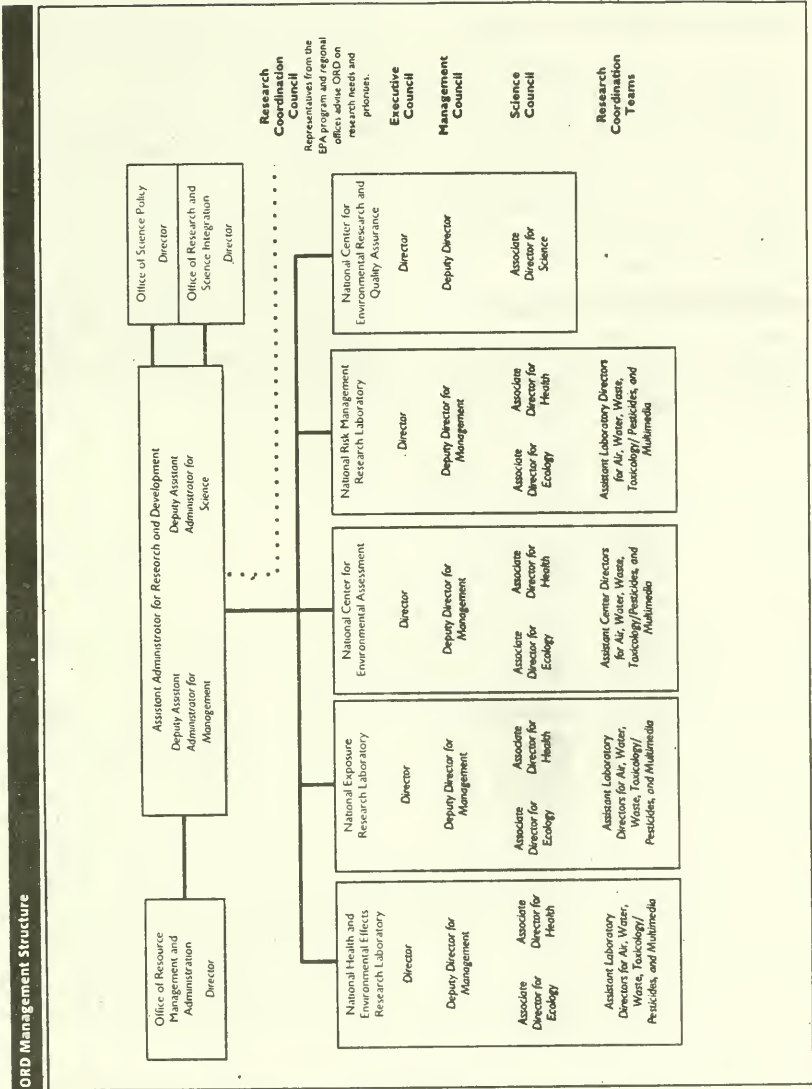
Office of Resource Management and Administration (who serves as the Vice Chair), and the Deputy Directors for Management of ORD's laboratories and centers. ORD's Management Council provides senior management leadership for developing and implementing effective management policies, procedures, and systems. For example, the Management Council is leading the development of ORD's Management Information System, a management system to ensure that ORD's resources are efficiently administered. The Management Council also provides input, feedback, and guidance on issues that significantly affect ORD's overall management operations.

Science Council

ORD's Science Council is chaired by ORD's Deputy Assistant Administrator for Science and includes the Deputy Assistant Administrator for Management as an ex officio member. Science Council members provide a balance between health and ecological research. They include the Associate Directors for Health and Ecology of ORD's national laboratories and centers, the Associate Director for Science of ORD's National Center for Environmental Research and Quality Assurance, and the Director of ORD's Office of Research and Science Integration.

The Science Council serves as the principal forum for identifying, discussing, and providing advice and recommendations to ORD's Assistant Administrator on scientific and technical issues that significantly affect ORD's overall scientific and technical operations. For example, the Science Council had the lead role in developing ORD's Strategic Plan and will review all research plans.

Appendix C



Research Coordination Council

The Research Coordination Council is a group of senior staff representing all EPA program and regional offices and their respective Assistant Administrators or Regional Administrators. The Research Coordination Council serves as a focal point for integration between ORD and EPA's program and regional offices. The Council provides ORD with a cross-agency perspective, participates in ORD's planning process, and recommends potential topics for ORD's research agenda and extramural grants program.

Research Coordination Teams

The Research Coordination Teams coordinate ORD's research program with ORD's clients and across ORD laboratories and centers. Organized by environmental media (air, water, waste, toxics/pesticides, and

multimedia), the teams assess ORD clients' needs, recommend research priorities, monitor ORD progress toward meeting these priorities, facilitate integration of intramural and extramural research activities, and ensure communication of results to ORD clients. Each Research Coordination Team includes a Team Leader from ORD's Office of Research and Science Integration, the Assistant Laboratory Directors from ORD's laboratories and centers, a program analyst from ORD's Office of Resource Management and Administration, a representative from ORD's National Center for Environmental Research and Quality Assurance to provide input on ORD's grants program, and representatives from EPA's program and regional offices. The Research Coordination Teams take the lead in developing ORD's research plans and in organizing and conducting media-based program reviews of ORD progress and outputs.

ORD Response to Blue-Ribbon Panel Recommendations

Recommended Action	ORD Response
EPA should take steps to improve science quality and enhance peer review ^{a,1}	We instituted standard operating procedures for peer review in 1994. To engage the nation's best research institutions, we expanded our program for extramural research grants selected from competitive, peer-reviewed proposals. We created a Peer Review Division in our National Center for Environmental Research and Quality Assurance.
ORD needs a coherent research-planning process, a robust mission statement, and a vision statement ^{a,d,f}	We developed the ORD Strategic Plan (this document) and distributed it for comment in November 1995. We implemented a risk-based research planning process. We realigned ORD's organizational structure to use risk assessment and risk management as principal priority-setting criteria.
ORD should enhance environmental education programs for training the next generation of scientists ^{a,d,e}	We initiated an expanded graduate fellowship program initiated, with 100 awards in 1995.
ORD should streamline its existing laboratory organization by collapsing the twelve laboratories into four national laboratories ^{d,f,h}	We consolidated ORD laboratories into three national laboratories and two centers in 1995 to align laboratories according to risk assessment and risk management components.
ORD should improve its management systems to track planning resources and accomplishments ^{a,h}	We are developing the ORD Management Information System to track resources and projects on an ORD-wide basis. We established a Management Council, a Science Council, and (together with the program offices and regions) a Research Coordination Council (see Appendix C of this Strategic Plan). We will conduct annual research program reviews to evaluate the status and accomplishments of our research. We are developing research plans to inform internal and external audiences about the policy relevance, specific objectives, technical approaches, and expected products of our research.
ORD should balance short-term and long-term research ^{a,g,i}	In 1995, we created the Science To Achieve Results (STAR) Program of peer-reviewed investigator-initiated grants relevant to ORD's mission. As described in this Strategic Plan, we give equal consideration to short- and long-term research needs in our priority-setting process.
ORD should balance health and ecological research ^{a,c}	We have adopted a balance between ecological risks and human health risks as a major strategic principle (see Table 1 of this Strategic Plan). We appointed Laboratory Associate Directors for Health and Ecology for each national laboratory.
EPA should designate ORD's Assistant Administrator (AA/ORD) as the Agency's Chief Scientific Officer. ^j	The EPA Deputy Administrator appointed the AA/ORD as EPA's Scientific and Technical Activities Planner in March 1995.
EPA must improve its capability to anticipate environmental problems ^{a,c}	EPA signed an agreement in 1995 with the National Research Council to establish a group to review environmental issues for the next decade and recommend necessary research.

¹Future Risk: Research Strategies for the 1990s. U.S. EPA, Science Advisory Board. 1988.²Reducing Risks: Setting Priorities and Strategies for Environmental Protection. U.S. EPA, Science Advisory Board. 1990.³Safeguarding the Future: Credible Science, Credible Decisions. Report of the Expert Panel on the Role of Science at EPA. U.S. EPA. 1992.⁴Environmental Research and Development: Strengthen the Federal Infrastructure. The Carnegie Commission. 1992.⁵Research to Protect, Restore, and Manage the Environment. National Research Council. 1993.⁶Assessment of the Scientific and Technical Laboratories and Facilities of the U.S. EPA. MITRE Corporation. May 1994.⁷An SAB Report: Review of the MITRE Corp. Draft Report on the EPA Laboratory Study. U.S. EPA, Science Advisory Board/Research Strategy Advisory Council. May 1994.⁸A Review, Evaluation and Critique of a Study of EPA Laboratories by the MITRE Corporation and Additional Commentary on EPA Science and Technology Programs. National Academy of Public Administration. June 1994.⁹Setting Priorities, Getting Results: A New Direction for EPA. National Academy of Public Administration. April 1995.¹⁰Interim Report of the Committee on Research and Peer Review in EPA. National Research Council. March 1995.

Mr. ROHRABACHER. Thank you very much, Dr. Huggett.

I would like to now turn to Mr. Ward who has an introduction for us.

Mr. WARD. Thank you very much, Mr. Chairman. I appreciate that.

I have not worked out any kind of a pun using "sono" or "lumiance."

[Laughter.]

Mr. WARD. But I am working on it. I just want you to know I am on the case.

Mr. ROHRABACHER. All right.

Mr. WARD. I appreciate very much your giving me the opportunity to introduce a constituent of mine who is here with us today to talk about safe drinking water.

Steve Hubbs is Vice President and Director of Water Quality and Production at the Louisville Water Company which serves over 720,000 residents of Louisville and Jefferson County.

The water company is owned by the City of Louisville.

Steve is a registered professional engineer and received his Bachelor's and Masters Degree from the University of Louisville in 1974 and 1975.

I also received my Bachelor's, but not in the speed school, from the Business School at the University of Louisville, in 1974.

Of course you know where we will be at ten o'clock tonight.

[Laughter.]

Mr. WARD. Steve's masters thesis, incidentally, was supported by a research grant from the Louisville Water Company to the University of Louisville, so he has some first-hand experience of the benefits of funding drinking water research.

He is one of the thousands of waterworks professionals who serve the drinking water community in a voluntary role through the American Waterworks Association.

I had the opportunity of living as a Peace Corps volunteer in a country and a region where drinkable regular drinking water was a luxury.

So I know firsthand the importance of the conversations that we are having today.

He is here today representing the Association and would like to offer a few words to us about the EPA Drinking Water Research Program.

Before he does, I have to apologize to Steve.

I have to make a presentation on an MSD project over at an Appropriations Committee in negative 4 minutes.

Mr. ROHRABACHER. Thank you, Mike.

Mr. HUBBS. And tell Gordon I said, hi.

Mr. ROHRABACHER. I have always been impressed with the people who are watching out for America's water. You can call them the "community of people," or you can call them a "culture of people" that just all know each other and it is an area of expertise that is so important to every country.

A lot of times these people are working so diligently right underneath—this is not a pun—but right beneath the surface, and the fact is, but the fact is that we appreciate your introduction and having—

Mr. WARD. Depending on what surfaces.

[Laughter.]

Mr. ROHRABACHER. But the fact is that we appreciate your introduction and having your constituent with us today. We thank you very much for joining us.

Mr. Hubbs?

**STATEMENT OF MR. STEPHEN A. HUBBS, VICE PRESIDENT,
LOUISVILLE WATER COMPANY, ON BEHALF OF THE AMERICAN WATER WORKS ASSOCIATION**

Mr. HUBBS. Thank you, Mike, and thank you, Chairman Rohrabacher, and members of the Subcommittee, for this opportunity to address you today.

We do have a formal written statement, and I would like to submit that for the record at this time.

Mr. ROHRABACHER. If there is no objection, your statement will be put into the record. And if you could summarize, we would appreciate it.

Mr. HUBBS. Thank you, very much.

There are three points that I would really like to focus on today out of that summary.

The first is the role of regulations in reducing risk to our constituents.

The second is the role and the responsibilities of the drinking water community and EPA in providing research to address these regulations.

And the third is how these roles interplay and how they affect public decisions at places like Louisville and across the United States.

First, the way I look at risk in a risk model for the drinking water community is that there are really three elements in this risk model.

The first is the source of contamination or how a contaminant enters our streams or our water sources.

Examples are pesticides applied to farmlands, discharges from wastewater treatment plants, or combined sewer overflows. That is the first element of the risk model that I look at.

The second element is what the drinking water utilities themselves can do in treatment towards removing these contaminants from the public water supplies.

This is something that I am very interested in, and something that I have focused most of my professional career in.

The third element of that risk chain specifically is the resulting health impact from exposure to these chemicals and pathogens of our constituents themselves.

This is the third element in this chain, and this is one that I think I want to address as much today as anything else.

The first two elements of this risk model have traditionally been very effectively handled by groups within the drinking water community themselves.

In 1983 EPA helped get the fledgling Research Foundation, the American Water Works Research Foundation off the ground with a \$3 million grant.

That grant has grown to a 1995 budget in excess of \$14 million specifically aimed at drinking water research.

This drinking water research focuses primarily on those first two elements of the risk model that I alluded to.

Specifically; how we can protect our source; how we deal specifically with the contaminants in our source waters.

And then, how we can remove those in our treatment plants.

The third link of that risk chain is one that I feel is an appropriate responsibility of EPA that is specifically dealing with the health effects and how these health effects impact our constituents.

In contrast to the increase in research in this direction for the first two elements to the drinking water community, EPA's budget in health effects, drinking water health effects research has decreased since 1983 to 1993 from a roughly \$10 million level to less than \$2 million.

This has not happened in an era of decreasing regulation, but instead in an era of increasing regulation, and in an era of increasing uncertainty.

This is not said or spoken to make EPA uncomfortable, but it is simply to bring the next point up.

That specifically is that drinking water utilities and public decision makers across the United States are being faced every day now with decisions regarding the Safe Drinking Water Act and how we will comply with the requirements of the Safe Drinking Water Act.

In knowledge of source information and knowledge of how we can treat these things, the one element where we are lacking information is exactly what benefit do our constituents take back from public health improvements as a result of the expenditures in source protection and in treatment? This is an element that I can personally reflect, from Louisville, Kentucky.

We are currently looking at a process that will involve about \$50 million of expenditure for our community in what I think is a very innovative technique approaching both the requirements of the Enhanced Service Water Treatment Rule for Microbes, and the Disinfection By-Product rule for the disinfection by-products that are required to be regulated in the near future.

This process—we call it "Riverbank Infiltration"—is going to cost our community about \$50 million, and we are prepared to make that type of a commitment for improved public health.

The one issue that we do not have, though, is a good, firm indication that this \$50 million commitment is going to result in a commiserate improvement in public health.

We simply do not have the data for this because the research has not been done in this direction.

It is admittedly extremely expensive research to do. It is very difficult research to do. But we do not necessarily know that that is going to be the deliberate outcome of this.

So I guess in conclusion what I would like—boy, you sure do have a questioning look on your face, and I would love to answer questions—now in conclusion, what I would like to say is that we do favor, and the American Water Works Association has supported Senate 1316—we do favor the increased budgeting specifically towards drinking water health effects research for EPA, and also

funding of research that will provide the good science background that is necessary to have good, sound science regulations in the future.

We very much support this.

Let me see if there was anything else I was supposed to say.

[Pause.]

No, but at this time I would like to open the floor to any questions you may have.

[The prepared statement of Mr. Hubbs follows:]

Testimony of

The American Water Works Association

before the

Energy and Environment Subcommittee

Committee on Science

United States House of Representatives

on

**Drinking Water Program
Research and Development Requirements**

March 21, 1996

presented by

**Stephen A. Hubbs
Vice President
Louisville Water Company
Louisville, Kentucky**

AMERICAN WATER WORKS ASSOCIATION
TESTIMONY BEFORE THE
ENERGY AND ENVIRONMENT SUBCOMMITTEE
COMMITTEE ON SCIENCE
UNITED STATES HOUSE OF REPRESENTATIVES

ON

DRINKING WATER PROGRAM
RESEARCH AND DEVELOPMENT REQUIREMENTS

PRESENTED BY
STEPHEN A. HUBBS
VICE PRESIDENT
LOUISVILLE WATER COMPANY
LOUISVILLE, KENTUCKY

MARCH 21, 1996

INTRODUCTION

Good morning, Mr. Chairman and members of the subcommittee. My name is Stephen A. Hubbs. I am the Vice President of Louisville Water Company, Louisville, Kentucky, and am here on behalf of the American Water Works Association (AWWA).

Thank you for providing us the opportunity to meet with you and the subcommittee today. AWWA appreciates the opportunity to present its views on the research and development requirements for Environmental Protection Agency (EPA) drinking water program.

The Louisville Water Company provides water to a population of approximately 720,000 residents in Louisville, Jefferson County and surrounding areas in Kentucky. It is wholly owned by the City of Louisville, and has used the Ohio River as its source since it started operating in 1860. The Louisville Water company is an active member of the AWWA and the AWWA Research Foundation.

The members of AWWA are dedicated to providing safe drinking water. Since our founding in 1881, our purpose has been to promote public health, safety and welfare through the provision of safe high quality drinking water. We believe few environmental or public health activities are more important to the health and welfare of this country than assuring the protection of water supply sources, and the treatment and distribution of safe drinking water to the American people.

The American Water Works Association (AWWA) is the world's largest educational and scientific association for water supply professionals. The over 55,000 AWWA members comprise the most extensive network of knowledge and experience for the whole spectrum of water supply concerns. AWWA expertise encompasses managers and operators running water systems, public health officials overseeing regulatory programs, engineers designing distribution systems, scientists analyzing water quality, researchers developing new treatment technologies, academicians studying innovative water management techniques, and educators imparting knowledge concerning water. Association membership also includes over 3,800 public drinking water departments and authorities, private and investor-owned companies and individuals engaged in providing over 80 percent of the drinking water delivered to the American public. The members of AWWA stand ready to share their knowledge and experience with the Congress.

DRINKING WATER HEALTH EFFECTS RESEARCH FUNDING

As a scientific and educational association, AWWA strongly urges that increased emphasis be placed on the use of health effects data in setting drinking water standards and strongly supports the authorizations and appropriations necessary to obtain this information. In this period of economic constraint and downsizing the federal government, we must be mindful of the functions that a federal agency can do better than other levels of government. Developing and collecting health effects data to form the basis for sound drinking water standards is one of the most effective use of federal funds. Increased authorizations and appropriations will be needed to do the very necessary analysis required to produce effective regulations to protect public health.

AWWA is concerned that overall cuts in federal spending may have an adverse effect on drinking water health effects research. While we acknowledge that EPA should take its fair share of federal budget cuts, we believe the cuts should be prioritized and targeted for maximum public health benefit. We urge the Congress to authorize appropriations that are adequate to run an effective drinking water research program in EPA and urge that those authorization levels be realized in appropriations.

An outside expert panel, commissioned by EPA, has called for a greater emphasis on science at the agency in their report, "Safeguarding the Future: Credible Science, Credible Decisions." The panel found, in part, that the agency needs to improve the scientific data and analytical methodologies necessary to make sound decisions and to set risk based priorities for health and the environment. This is particularly true for drinking water contaminants. In setting their priorities, EPA must continually consider the critical risk reduction potential associated with drinking water research and funds appropriated should be allocated to programs accordingly.

It should be noted that drinking water health effects research is an area where relatively small funding increases may offer significantly great public health, environmental and economic benefits to the nation's population. It is important to remember that, of all EPA programs, the drinking water program is one of the few that directly affects 100 percent of the US population. In recent years, Congress has not appropriated sufficient funds for all EPA programs and EPA has shifted funding from drinking water research to other agency programs. AWWA considers health effects research as one of the most critical needs in the drinking water program. Additional funding for drinking water health effects research could come from a number of areas in EPA's budget with negligible impacts on risks to human health or the environment. The multi-media research budget (which has grown at the expense of drinking water specific research) or other areas of the overall multi-media program budget, which had been projected to grow 38 percent to over \$590 million, are such areas to consider.

The decline in real funding levels for drinking water programs is nowhere better illustrated than in health effects research. As requirements to regulate drinking water contaminants have grown dramatically, the health effects research budget has decreased precipitously. Despite the mandate of the 1986 amendments to the SDWA, which more than quadrupled the number of contaminants EPA was to regulate, funding for health effects research on contaminants has dropped continuously from a 1982 level of almost \$10 million to the FY96 budget's all time low request of less than \$2 million. (The enclosed chart dramatically illustrates this trend.) Additionally, over the past ten years, the number of EPA personnel dedicated to health effects research has decreased from a high of 58 full time equivalent positions to about 20 today.

EFFECT OF DRINKING WATER RESEARCH ON LOCAL COMMUNITIES

Local communities, over the next ten to fifteen years, face the potential requirement to pay over \$100 billion to meet new drinking water regulations required under the SDWA. Expenditures of this magnitude must be made with a high degree of assurance that the anticipated reductions in risk are realized. There must also be a sense that the highest public health priorities are being addressed. These risks can only be measured on a foundation of sound science and drinking water health effects research. These elements have been significantly under-funded in the past ten years, and further reductions could force decisions involving billions of dollars to be made in the absence of information indicating the benefit of these expenditures. Adequate investment in health effects research is the only way to ensure that public health threats in drinking water are identified, that the presence or absence of significant risks are determined and that the proper priorities of addressing the risks are established.

This point is clearly made with the Louisville Water Company, which is currently involved in research to allow compliance with the anticipated regulation for microbials and disinfection by-products. The identified processes are expected to cost in the range of \$50 million. The science is well documented identifying the water quality improvements that will result from this expenditure. What is not known is the resulting public health benefits that will be realized. In the absence of this information, decisions regarding this expenditure will have to be made based on assumptions representing uncertainty. Being forced to deal with this uncertainty impairs the ability to make public health decisions based on priorities and to be assured that public funds are used most effectively. Many communities throughout the nation are faced with the same situation and even higher dollar amounts. The costs of complying with SDWA requirements could be better justified to the public with better health effects research.

The risk chain for drinking water involves contaminant sources, a vector (water), treatment for removal, transmission to the population, ingestion, infection, and finally disease. Without a thorough understanding of this entire chain, neither the public nor government decision-makers have a solid basis on which to judge the safety of drinking water.

Congress required through the SDWA that EPA regulate contaminants in drinking water to protect public health. When adequate health effects data are not available upon which to base public health regulatory decisions, those decisions are based on unsubstantiated assumptions upon which additional assumptions are made, reflecting uncertainty, potentially costing consumers billions of dollars for an uncertain benefit. The public is not well served by this process.

Drinking water health effects research is, therefore, an area where the investment of a few million dollars can provide the knowledge necessary to prevent the potential waste of billions of dollars of the American consumers hard earned dollars. Likewise, an investment in drinking water health effects research, will ensure that the over 240 million people in this country served by public drinking water systems will receive protection from contaminants that have significant adverse public health impacts.

EPA DRINKING WATER REDIRECTION PLAN

EPA recently prepared a draft Comprehensive Drinking Water Redirection Plan for comment. The primary objectives of the plan are the use of sound science, risk-based standard setting, implementation partnerships, and source water protection. EPA has not established any priorities among these objectives; however, AWWA has recommended that the highest priority be given to the use of sound science and risk-based standard setting. Although, the plan does not contain information on additional

resources needed (i.e., budget dollars and/or Full-Time Equivalents (FTEs)), we urge that EPA be asked to "flesh out" this plan and work with the Congress to establish sound authorizations and funding priorities for drinking water health effects research.

It is not clear how the Drinking Water Redirection Proposal will impact EPA's overall research planning and execution. However, we urge that EPA research activities be modified to reflect these new drinking water priorities and recommend that authorizations and appropriations for EPA also reflect these priorities.

In our testimony today we will highlight the priorities for sound science and risk-based standard setting which should be supported by authorizations and appropriations.

SOUND SCIENCE

AWWA strongly supports the use of sound science and adequate data. The use of good science is the foundation of our efforts on reauthorization of the Safe Drinking Water Act (SDWA). We have strongly supported EPA's interaction with the Science Advisory Board (SAB) and the scientific community in the past. We encourage EPA to continue to use the available SAB resources, and to make an increased effort to follow the SAB's recommendations in the regulatory development process. We support EPA's new emphasis on peer review in the regulatory development process, and would encourage EPA to broaden their circle of peer reviewers.

AWWA strongly supports the use of the best available science and improved methodologies for estimating the risk posed by drinking water contaminants. AWWA encourages EPA to look at other dose-response models, in addition to linear extrapolation. For example, some recent studies on arsenic point toward a "hockey-stick shaped" dose response curve rather than a linear one. AWWA supports the use of the best scientific approaches for characterizing the variability and uncertainty in risk estimates.

AWWA generally supports EPA's efforts on the new cancer risk guidelines and the new risk characterization policy. The new cancer risk guidelines are working toward bringing the new scientific advances in understanding cancer mechanisms into EPA. EPA's release of a new written risk characterization policy could be a step toward bridging the gap between risk assessment and risk management. How the new risk characterization policy is implemented by the program offices will determine its effectiveness over the long run.

Research and development authorizations for EPA programs should provide adequate funding to ensure that good science is incorporated into EPA regulations

and policies.

RISK-BASED STANDARD SETTING

AWWA strongly supports giving the total Microbial Contaminants and Disinfection By-Product (M-DBP) regulatory package the highest priority. AWWA recommends expanding the microbial side of the M-DBP regulatory package to include not only the "Enhanced" Surface Water Treatment Rule (ESWTR), but also a revised Total Coliform Rule (TCR), and other considerations. AWWA recommends that EPA take the opportunity of developing the ESWTR, which focuses on additional treatment at the plant, to take a hard look at microbial protection in the distribution system with a revised TCR. Distribution systems could turn out to be the weak link in total microbial protection. AWWA supports including the Groundwater Disinfection Rule (GWDR) in the total M-DBP regulatory package.

The expanded M-DBP regulatory package is linked through the balancing of microbial and chemical risks, and should follow the same regulatory development schedule, i.e., the Stage 1 Disinfectant/Disinfection By-Products (D/DBP) rule needs to be promulgated at the same time as the "Interim" ESWTR. These regulations are also dependent on the reliable execution of a valid Information Collection Rule (ICR) and required health effects and treatment research. The ICR and the necessary research are already two years behind schedule.

While EPA has developed a M-DBP research plan, the plan does not contain any action tasks, financial feasibility or prioritization. At this time the plan is a list of all research that should be done, without any prioritization between the multitude of research projects. As an example of the lack of prioritization, the most critical need for this regulatory package, in our opinion, is a reliable and reproducible analytical method for *cryptosporidium*. Yet at this time, EPA is currently conducting no research to improve that method.

All this points to the critical need for research authorizations and appropriations to support the drinking water program. A continuing need for research to identify contaminants for possible regulation will exist even when the SDWA is reformed. AWWA strongly recommends, as a high priority, specific authorizations to provide the necessary scientific data to develop a drinking water regulation for D/DBP and *cryptosporidium* as well as for those contaminants, such as arsenic, for which the EPA SAB has recommended further research.

DISINFECTANT AND DISINFECTION BY-PRODUCTS (D/DBP)

Research on disinfectant and disinfection by-products (D/DBP) is a critical need. Each day there are 50,000 deaths in the world attributed to microbial contamination

of drinking water. This threat has essentially been eliminated in the United States through disinfection of drinking water and several treatment technologies. It is now known, however, that disinfection of drinking water can produce chemical by-products, some of which are suspected potential human carcinogens or may cause other toxic effects. Controlling risks from these by-products must be carefully balanced against microbial risks to ensure that when controlling disinfection levels to lower by-product risk, significant microbial risks faced by the majority of the world's population are not created.

Research on D/DBP, as endorsed by the National Academy of Sciences and EPA's Science Advisory Board, is essential. The cost to the nation of D/DBP regulation under the SDWA could be as low as several billion dollars or as high as \$60 billion or more. An appropriate investment in health effects research will ensure that costs of regulation will be commensurate with the health benefit and not driven to extremes because of the lack of data.

CRYPTOSPORIDIUM

Cryptosporidium has emerged as a microbial pathogen of major concern to drinking water supplies. The Centers for Disease Control, in correspondence with EPA, has pointed out that extensive research on the health implications of the pathogen and dramatic improvements in analytical methods for its detection are necessary before it is possible to evaluate the public health implications of its occurrence at low levels and determine the appropriate regulatory response. Adequate funding for research on *cryptosporidium* is essential to protect the health of millions of Americans. Although *cryptosporidium* is currently one of the highest priority microbial contaminants of concern, it is only one of many microbes that could be of concern in drinking water.

ARSENIC

Arsenic is a naturally occurring substance that is found in some drinking water supplies and is required to be regulated under existing law. The currently available scientific information for arsenic may be of questionable value in determining an appropriate standard for drinking water. Arsenic has not been found to be a health threat at the very low levels naturally found in some waters and also is a trace element essential to human health in organic form. EPA has stated that additional research is warranted prior to promulgating a regulation and the EPA Science Advisory Board has recommended further study of the health effects of arsenic.

RESEARCH MATCHING GRANTS

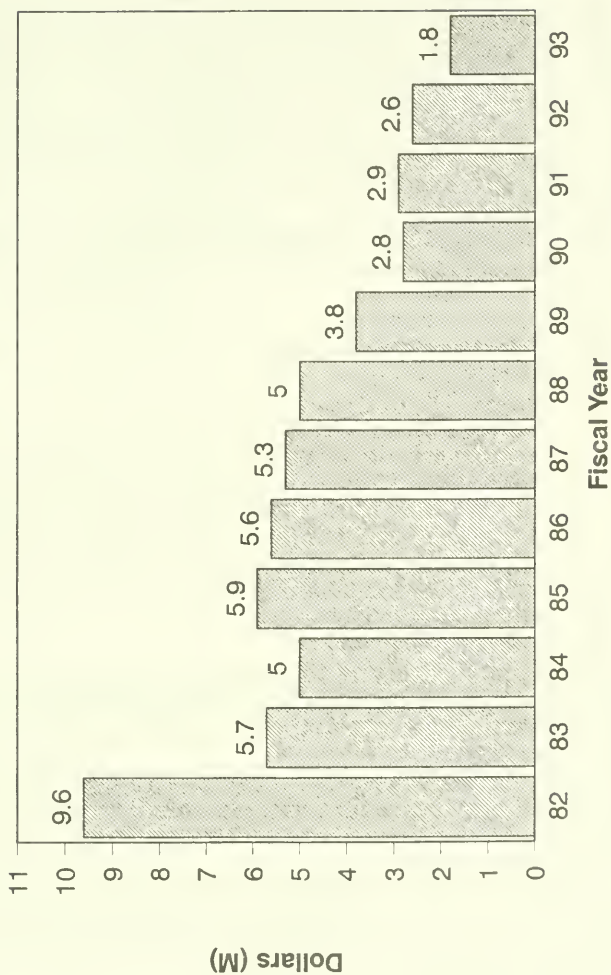
Last year the AWWA Research Foundation requested that \$5 million in drinking

water research funds be earmarked specifically for the Research Foundation to be matched by public water suppliers dollar-for-dollar. AWWA strongly believes that this kind of public/private or local/federal research partnership is a wise and cost effective use of public funds and the best way to secure science based drinking water regulations in these difficult budgetary times. Since 1983, the AWWA Research Foundation has invested \$85 million to support 350 drinking water research projects. AWWA Research Foundation projects include research on disinfection by-products and *cryptosporidium*. AWWA encourages the Congress to continue to support a partnership approach to drinking water research.

CONCLUSION.

Thank you for this opportunity to present our views on the research and development requirements for Environmental Protection Agency (EPA) drinking water program. This concludes our statement. I would be happy to address any questions or comments that you may have.

EPA Drinking Water Health Effects Research



Mr. ROHRABACHER. Well, thank you very much.

We appreciate that. And I will be asking you about how much that research would cost specifically as to a \$50 million expenditure by your community, and how much is it going to cost us to know if that expenditure is worthwhile?

Mr. HUBBS. If I may clarify just a little bit, that is \$50 million in Louisville. The estimate for complying with the Safety Water Drinking Act allocations across the next several years approaches \$100 billion.

Mr. ROHRABACHER. I understand that. I was understanding that the research for your community would be applicable to other communities, as well.

Mr. HUBBS. Exactly.

Mr. ROHRABACHER. We will get to that in a moment after I talk to Dr. Huggett.

Mr. HUBBS. Thank you.

Mr. ROHRABACHER. Dr. Huggett, first of all can you summarize your research priorities for Fiscal Year 1997? What are your top priorities?

And I know it is hard to ask you to give us a low priority—

Dr. HUGGETT. I can tell you some things that we are dis-investing in, and that by definition would be of lower priority.

Mr. ROHRABACHER. There you go. If you would, put your microphone a little closer, please.

Dr. HUGGETT. Yes, sir.

The major priority is in particulate matter. As I mentioned before, we have an increase in the 1997 budget of roughly 55 more people within EPA working on it, as well as a \$4.2 million increase in research.

Urban toxics. These are basically things that we have in our cities and our towns that are somewhat unique in the atmosphere. We have an increase there of 18 people and approximately point nine million dollars.

Drinking Water Disinfection By-Products and Microbes: again, what we are talking about here, we have 134 people working on that, an increase of 24.7 FTEs, or full-time equivalents, and an increase of \$3.3 million in this area.

Mr. ROHRABACHER. Okay.

Dr. HUGGETT. Endocrine Disruptors: a total of 52.9 people and an increase of \$2.1 million in this area.

Pesticides in Children: we have an increase of 23 people working in this area this year. I could go on, but—

Mr. ROHRABACHER. That is fine.

Dr. HUGGETT. I can now give you some ideas of—

Mr. ROHRABACHER. Of what you are cutting out there?

Dr. HUGGETT. Of what we are cutting out.

Mr. ROHRABACHER. All right.

Dr. HUGGETT. Obviously we are in a budget situation where if we are increasing dollars in one place it has to come from someplace else.

We are decreasing some of our work on indoor air, basically because we have redirected the FTEs to strengthen our in-house efforts and assessments.

We are doing less in the field of lead. This is partially because—well mainly because we know how to detect lead now, and we know very much about it. Our research has been productive, so now it is time to move on.

We are reducing the Environmental Technology Initiative by \$52 million, the ETI program.

Our High-Performance Computing and Modeling, we are reducing that by \$3.3 million.

We are reducing some of our work in Tropospheric Ozone. It is one of our high areas right now, and in the 1997 budget we believe we will have completed some of the work that is ongoing now and we can move on to other things.

Mr. ROHRABACHER. When you say "indoor air," interestingly enough I have a major problem with indoor air because I have allergies. There has been extensive study done on indoor air in the past?

Is that correct?

Dr. HUGGETT. Yes, sir.

Mr. ROHRABACHER. Let me ask you this: has there been any legislation that has been prompted by that research?

Dr. HUGGETT. Sir, I am not aware of that. I will get back to you with it.

[The following information was received for the record:]

Question: What legislation or regulation can be cited as a direct result of EPA's research on indoor air?

Answer: Title IV of the Superfund Amendments and Reauthorization Act mandates EPA to "conduct research and disseminate technical information" on indoor air quality. In response, the EPA program offices and many others, based in large part on the research results from EPA's Office of Research and Development (ORD), provide information on indoor air quality for consumers, building owners and managers, public health professionals, etc. Notable examples include EPA's "The Inside Story: A Guide to Indoor Air Quality," "Building Air Quality: A Guide for Building Owners and Facility Managers," and the "Consumer's Guide to Radon Reduction."

Such information enables both the public and private sectors to improve indoor air quality in voluntary, non-regulatory ways. Examples of voluntary industry consensus standards that draw, in part, upon ORD indoor air research include:

—American Society of Testing and Materials (ASTM) standardized methods for characterizing the emissions from indoor pollutant sources (e.g., paints, composite wood products) and the environmental factors that affect these emissions (e.g., temperature, ventilation rates)

—American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE) testing standards for particulate air filters.

Mr. ROHRABACHER. I would like to know that, because I think it is very clear now that during the 1970's when people were talking about energy efficiency or concentration—it depends on which way you want to put it—that we came up with all of these new buildings.

You can always tell the buildings that were built during this time period because you cannot open any of the windows. They look like some kind of a box, but you cannot open the windows. It is just a box with glass on the outside.

I understand there—I personally know that there is a risk factor in having the air just being recirculated because every time I go into these buildings I start to cough and I cannot even talk, which is not necessarily something that the people inside the building care about, but—

[Laughter.]

Mr. ROHRABACHER. But the fact is that for me it is a problem.

But what it seems to me would be important was if we spent money on research on indoor air, there should have probably been some change that we could point to and say, this is the change in the law that came from this research, or this is the change in the regulations that came from this research.

I would like to see that—and I am not saying that there is not, but frankly these hearings are to educate us, as well.

Could you have your office send us something like that?

Dr. HUGGETT. I will certainly do that. I will tell you, but I would—I would like to tell you that I am not just absolutely sure of this, but I am not sure we have the authorization to regulate indoor air.

[The following information was received for the record:]

To your knowledge, has EPA ever requested the authority to regulate indoor air quality in private homes?

To my knowledge, EPA has never requested the authority to regulate indoor air quality in private homes. Title IV of the Superfund Amendments and Reauthorization Act mandates EPA to "conduct research and disseminate technical information" on indoor air quality. Accordingly, EPA program offices and many others, based in large part on the research results from EPA's Office of Research and Development (ORD), provide information on indoor air quality for consumers, building owners and managers, public health professionals, etc. Notable examples include EPA's "The Inside Story A Guide to Indoor Air Quality" and "Building Air Quality: A Guide for Building Owners and Facility Managers."

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—American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE) testing standards for particulate air filters.

Mr. ROHRABACHER. But what I am asking for is whether or not some regulations were actually imposed or changed because of the research that was done.

Dr. HUGGETT. Yes, sir.

Mr. ROHRABACHER. Now in terms of streamlining your current laboratory operations, what are the benefits of the laboratory realignment?

Dr. HUGGETT. One of those benefits has been in our conduct of research and the planning of research.

One of the major changes that we made is we separated management, per se, from science. We have approximately 1,900 people in the Office of Research and Development.

As of last year, which is the latest date I have on the number of people with Ph.D.s and people with Masters, we had 500 Ph.D.s within this group. We wanted to make sure that those people with Ph.D.s were doing science and not management.

Our product is Science and Technology. Our product is not management.

Mr. ROHRABACHER. Right.

Dr. HUGGETT. The managers are there to help the scientists and engineers do their work better and more efficiently. They are very important. We could not work without them. But one of the major things we have done is that I have two deputies in my office, a

Deputy Assistant Administrator for science who does no management, and a Deputy Administrator for management who does no science, and they are right here [indicating].

In each of our laboratories we have a deputy lab director for management. They, with the deputy that I have from management, form a management council. Their job is to make sure we comply, obviously, with all the regulations and are as efficient as possible.

Each lab has associate lab directors for science. They and the deputy for science form the science council. It is one of the major things that we have done.

Mr. ROHRABACHER. Well I appreciate that.

Could you tell us—I understand the Senate bill that we are talking about here would establish a new Southwest Center, and I am not really clear about the details of it, myself, for environmental research. Is this a priority for EPA? And if so, where would that rank? And do we really need this new Center?

I understand that that is what the Senate is pushing.

Dr. HUGGETT. Sir, we are not in favor of that Center. The universities that are involved in the Center are good. They are topnotch.

The problem with something like this is that it takes away the flexibility that we have to do our work. We believe that the best way to involve the academic community in our work is through competitive, peer reviewed proposals.

Now if indeed these are the very best places to get our work done, if they apply for a grant and they get the highest peer review, then they will receive the money.

Mr. ROHRABACHER. But just putting it into the bill on the Senate side is not the right process?

Dr. HUGGETT. Not in my opinion, sir.

Mr. ROHRABACHER. Well thank you very much. We wanted to make sure you were on the record on that.

Mr. Hubbs, again, how much is it going to cost for us to determine whether that \$50 million expenditure by your city is worthwhile?

Again, obviously it is applicable to other cities, as well.

Mr. HUBBS. I had time to think about that, which was good. I would like to point out how much money is being spent in research outside of that arena to try to put it in a little better perspective.

The Information Collection Rule is requiring the water utilities across the United States to spend about \$130 million in occurrence and treatment portions of that regulation.

The Research Foundation is pouring about \$14 million a year into research aimed at the total gamut of research in water industry needs, but a great deal of that is focused toward microbes and disinfection by-products.

The EPA research and development portion for drinking water health effects has decreased over the past 10 years from \$10 million to \$1.8 million, or in that range.

I certainly would not—and I cannot answer that question; it is going to take \$10 million worth of research to be able to answer this question—but I do know that that trend has to be reversed if we are going to get good information upon which to base our public decisions.

Mr. ROHRABACHER. But right now that information is not available in your community——

Mr. HUBBS. That is true.

Mr. ROHRABACHER. So that you do not know if making this decision, a \$50 million decision, on your treatment of your water is going to be worthwhile or not in terms of public health because the research is yet to have been done at another level?

Is that correct?

Mr. HUBBS. We are continually forced to deal with uncertainty in our field, as probably everyone is. Our goal, and one of the things Dr. Huggett mentioned, is to constantly try to decrease the areas of greatest uncertainty.

Mr. ROHRABACHER. What I would like to know, and you do not have to tell me now, and you can get back to me on this, and Dr. Huggett, this is a question for you, as well, I would like to know how much it would cost us more than what we are already paying for all the research we are already conducting to determine the answer to this man's question for his community, with the understanding of course that it is applicable to other communities, as well.

I would just like to know about this particular problem, and what it is, to just sort of use it as a benchmark for my understanding of how these decisions are made.

Mr. HUBBS. Okay. I can give you a few isolated items that we are dealing with right now.

I do chair the Research Advisory Council of the American Water Works Association Research Foundation. We are looking into developing a Swine Model. We cannot do our experimentation, not ethically, on human populations. That Swine Model right now is a first step in some of this research that goes for about \$350,000.

We look at this as the first step in a developing program. I do not know what that final dollar sign is going to be because we have not developed it yet, but I think that it should grow substantially. I think that eventually it should approach at least the mark it was at in 1983.

Mr. ROHRABACHER. One last thought. Research should be aimed at determining something, and then the research should be over, like we were mentioning about the clean air, or internal inside air research.

Because something is getting less money in research money this year compared to 5 years ago is not necessarily wrong. You could say that the Ph.D.s and the professionals involved in that research determined that we have gotten most of what we can get out of the research dollar, and let's move on to other areas where the money can be better used.

That is why I was asking about this inside air research that took place in the past.

So funding, in and of itself, is not, as Dr. Huggett said, that is not the goal. The goal is not to have better managers. The goal is for the managers to be able to make sure the whole system works better.

So with that, I will turn it over to Mr. Roemer.

Mr. ROEMER. Thank you, Mr. Chairman.

I would like to follow up on your thought there. Certainly Dr. Huggett's reply to your question about when we spend money on a program such as making recommendations rather than regulations on the quality of indoor air, I think Dr. Huggett's response to you was a good one.

I would even take it further and say that that program did not necessarily result in new regulatory standards for the industry to try to live up to.

Conversely, it resulted in voluntary programs that were established with the building industry so that they would get information out to new builders for new design and new architectures so that they would not build those kinds of buildings with the kinds of windows in it that give you the kinds of problems that you have experienced.

They were also working with private standard-setting bodies, again not regulatory per se coming from EPA, but working with the private sector to set up a voluntary program.

Do we eventually take those things off the books at some point? Probably so. Probably we want to.

So I think that maybe that was money well spent and now we need to take it off of the books. Because it does not result in regulations does not mean that it was not successful.

Would you agree?

Dr. HUGGETT. Yes, sir, I would agree with that. I would add that this Administration, particularly under the direct leadership of Carol Browner, it is part of our common sense initiative to work more with the private sector, with industry to get—to achieve the goal, not simply regulation.

Mr. ROEMER. And I would encourage you, Dr. Huggett, to continue on that common sense initiative. So many people in my constituency in Indiana, small businesses and farmers and so forth, would like to see a lot more common sense coming out of these initiatives and these policies.

Let me follow up on what you think of this book that is going to be published called "Stolen Future."

Certainly when you and I met last week you told me you were very concerned about some of the findings in this book. Now I want to try to find some new ideas here, Dr. Huggett.

We have some people that are the Chicken Little theorists that say this is not going to result in any problem whatsoever and we should ignore this.

We have other people saying, well, let's devise a whole new set of regulations and start to put them forward.

I think I disagree with both those kinds of theories. I want some new ideas in what you might propose as to how EPA is going to begin to react to what might be—and I say, and underscore "might"—might be some very disturbing scientific findings.

What do we do?

What are some new ideas and new partnerships that we might set forward in this case?

Dr. HUGGETT. That is an excellent question. I personally worked on compounds of this sort. We did not call them "endocrine disruptors," but—

Mr. ROEMER. You might explain to people what endocrine disruptors are, and how a microwave process might be complicating this for young children that we are microwaving food products for, and so forth.

This is something I think needs to be explained in common sense terminology.

Dr. HUGGETT. Your endocrine system is basically your hormonal system. It determines, for instance, the sex of the human or animal.

Endocrine disruptors are chemicals that either mimic hormones themselves—sometimes the literature calls them “estrogen compounds” or they call them “environmental estrogens”—that is one way they can act. In other words, they have a structure comparable to a hormone and basically fool the cell.

Another way they can act is they can block a hormone from hitting the cell. They can take up a site on the cell so that the hormone, for instance, androgen, which is the male hormone, cannot get to the cell so you get an unbalance between estrogen and androgen and you get a feminine result.

I have worked with these in the environment. One of the most common we think about of these is DDE, the breakdown product of DDT that resulted in the demise of hawks, eagles, and falcons.

Since the ban of DDT in 1972, there has been a tremendous recovery of these birds. And in fact the Bald Eagle is now off the Endangered List.

Another one of these compounds that I personally have been involved with is tributyltin, TBT. It is an antifouling agent used on the bottoms of vessels, a very, very effective mechanism for keeping barnacles off of boats.

The problem is that in certain animals, and in particular oysters, the species *Crassostrea gigas*, which is a Japanese oyster that we raise in huge numbers in this country in Oregon and Washington, and it is quite common now in Europe, it changes the sex of the animal so that all of them become male. Oysters have the ability to change sex on their own. This basically pushes them towards maleness. It's called imposex. It also causes some snails, or gastropods, such as the dogwhelk and the mud snail to actually grow male reproductive organs and become male.

So these are in the environment.

The questions we have now are whether or not effects such as changes in masculinity, changes in sperm count, such as that, are actually happening with humans due to these compounds.

Now the fear that I have is that, when it comes to biochemistry, humans are not a great deal different than many of the lower forms of animals of life. The question that one might ask is: if it is not affecting humans and they are being exposed to the same compounds, the question should be, “Why not?”

Mr. ROEMER. What does “Stolen Future” say?

Dr. HUGGETT. Well, “Stolen Future” basically to me is a very large red flag. The wildlife effects I think we have known. The scientific community has known this. So I do not think there is a great deal of debate.

The debate now is on the human. The red flag is saying, we need to look at this. We need to develop better methods for determining

whether chemicals, or pesticides, or whatever, are endocrine disruptors.

I think the thing we have to also remember is, it was not until 1961 or so when Watson and Crick won the Nobel Prize for DNA, a relatively short period of time in the fields of science.

We now have tools available to us that we did not have just a decade ago. I think of the O.J. Simpson trial when they talk about polymerase chain reactions. That was unheard of just a short time ago.

We now have tools and abilities to look at compounds like this, to screen them, that we have not had before and we have to start working on it with greater vigor.

Mr. ROEMER. Thank you, Dr. Huggett.

Thank you, Mr. Chairman.

Mr. ROHRABACHER. Mr. Bartlett?

Mr. BARTLETT. Thank you very much.

There is some evidence in humans, I understand, which is clearly circumstantial evidence, but would lend some credence to the notion that these endocrine disruptors are having an effect in humans.

As you probably know, for the past 3 or 4 decades sperm counts in human males have been coming down. With the decrease in sperm counts has been an increased percentage of abnormal sperm.

Although it only takes one sperm out of millions for a conception, when the sperm count is down and the number of abnormal sperm are up for reasons that we do not understand, that markedly decreases the probability of conception.

I do not think that anybody knows why this is happening, but at least this is some evidence that goes along with your more specific evidence from the animal world that there are these hormone disruptors that may be having an effect in humans.

Can you tell me if nitrates and nitrites are handled similarly metabolically and physiologically?

I see them in some places grouped together, nitrate/nitrites. Is that because they are handled similarly metabolically?

Dr. HUGGETT. No, sir, I do not believe that they are. But I will get back and I will make absolutely sure of that. I am an environmental chemist, but not a physiologist, but I do not believe that they are.

Mr. BARTLETT. You think that they are handled—I have seen them just “nitrates/nitrites” with a slash between, which indicates that they are—it is my understanding that metabolically that the body handles nitrates and nitrites in a similar fashion.

My question is. If that is true—let us presume for a moment it is true—why is it then okay if we eat these things but not okay if we drink them?

We have very stringent requirements for nitrates in drinking water, 10 parts per billion, I think, for nitrates, but the similar requirement for nitrites in food just is not there. Because a single hot dog will contain more nitrites than you would get by drinking barrels of water.

Is that because the EPA controls water and hot dogs are controlled by Food & Drug?

Dr. HUGGETT. I think in fact that is true, that Food & Drug handles hot dogs, but the chemistry of nitrate and nitrite are fundamentally different.

One of the problems that we worry about with nitrites in food is the formation of nitrosamines, which are carcinogens when the food is cooked.

Mr. BARTLETT. Which makes nitrites even worse than nitrates.

Dr. HUGGETT. Depending on the temperature and a number of other things.

Mr. BARTLETT. But yet, if I am not mistaken, hot dogs—that is why they are nice and red, is because they contain a whole lot of nitrites that are put in there in the processing. They would have kind of a dull green color, otherwise, if they did not have all these nitrites in them.

If you could for the record, provide some information on whether or not there are fundamentally different metabolic and physiologic effects for nitrites and nitrates?

And if there are not, then why these very great differences? Apparently nitrites are not a problem to Food & Drug, whereas nitrates are a major, major problem for drinking water.

[The following information was received for the record:]

NITRATES AND NITRITES

The principal health effect of concern from exposure to nitrate or nitrite is methemoglobinemia (also known as "blue baby" syndrome). EPA has set drinking water standards of 10 mg/l nitrate, and 1 mg/l nitrite, to protect against methemoglobinemia in infants. Infants are susceptible to this disease because they have a different type of hemoglobin than do adults, and they can quickly become ill if ingesting water or formula with elevated nitrate or nitrite concentrations. Infants are also more vulnerable because they typically consume more water per kilogram of body weight than do adults. The EPA standards are based on human data on occurrence of nitrate/nitrite in drinking water and associated methemoglobinemia in infants.

Nitrites are present in some foodstuffs (such as preserved meats) at higher levels. However, older children and adults who consume these foods do not appear to be at risk for methemoglobinemia. In regard to potential effects of long-term exposure, most studies in animals on the carcinogenicity of nitrite have been negative, except when administered in conjunction with high levels of nitrosatable amines. In these instances, carcinogenic nitrosamines can form in the stomach. While there is the potential for ingested nitrite to react with nitrosatable substances in the diet to form nitrosamines, it is thought that antioxidants, such as vitamin C and vitamin E, play a protective role. EPA has not completed an assessment of the cancer risk of nitrites, and has not based any health standards on this endpoint.

Mr. BARTLETT. I just want to come back to the \$50 million.

You know, your city, Louisville, is just one of I don't know how many cities across the country that is faced with the same kind of a requirement.

In the last Congress we passed legislation looking forward rather than back—I think the American people expected us to look back as well as forward—which said that there would be no new regulations unless they met three criteria.

One was that they be based on good science, and I notice in your testimony that you support that.

Second was that the cost be justified by the benefit. And that is your question, Mr. Hubbs, you wondered if this \$50 million you have to spend because of a mandate from the EPA is going to in fact provide \$50 million in benefit for your consumers.

And the third thing that we asked for was that you tell us what the relative risk is. If you are a golfer, there is a risk of being struck by lightning on the golf course on a clear day. That is a measurable risk.

It is not the kind of a risk that people want to be protected against. I do not see our golfers carrying an antenna that drags on the ground that if lightening strikes the charge will be carried off to the ground rather than through them.

I suspect that many of the things that we are being protected against, that the relative risk is no greater than the risk of being struck by lightening on a golf course on a clear day.

Do you subscribe to using these three criteria for any new regulations that you put into effect?

And do you have a problem with looking back to see which of the regulations are now in effect which become mandates costing our local communities untold millions of dollars, billions when you multiply communities across the country, so that we can bring an element of sanity into it?

For instance, in drinking water I understand that we are still requiring all of our water districts to test for, is it a herbicide, or an insecticide that is used on pineapples, and they do not grow those in Western Maryland? Do I understand that our water quality people still have to test for that?

Dr. HUGGETT. Sir, we certainly do agree with the prioritization of what we do based on risk. There is no doubt about that.

Relative to the pesticide, if I am not mistaken it is used on pineapples, but at one time it was used on many other crops in the continental United States and it is my understanding that the number that pops into my mind is something like 26 States have it in their groundwater from past use.

I will make sure that number is correct. But quite a number of States have it. It is not true that it is not a problem in the continental United States.

[The following information was received for the record:]

DBCP, PESTICIDE USED ON PINEAPPLES

DBCP (1,2-Dibromo-3-Chloropropane) is a pesticide which was widely used until 1979 to control nematodes on more than 40 crops. These crops included soybeans, peanuts, commercial vegetables, citrus, grapes, cotton, and many others. In 1979, all uses of this pesticide were canceled by U.S.E.P.A., except for use on pineapples. Use on pineapples was canceled in 1985.

DBCP has been detected in the groundwater wells in 23 states. In 19 of these states, at least one detection in a public water supply exceeded the MCL of 0.0002 mg/l. Because DBCP had been applied by subsurface injection, the potential for migration to and contamination of groundwater was high.

Mr. ROHRBACHER. Thank you, Mr. Bartlett.

Mr. BARTLETT. Thank you.

Mr. ROHRBACHER. Mr. Olver, do you have some questions?

Mr. OLVER. Thank you, Mr. Chairman.

I am not sure whether I am going to be a straight man in this, or exactly what, but I notice in your testimony, Mr. Huggett, that you talk a good deal about research on disinfection by-products, and also about research on disease-causing organisms in water.

Would you call a pathology outbreak in a case where there has been chemical disinfection, would you call that a waterborne dis-

ease outbreak? Or is there some terminology that I am missing in this area?

Dr. HUGGETT. Are you saying that if there is an outbreak of something that approximates intestinal flu, would I call that a disinfection by-product, or a microbial problem?

I am not sure I understand your question.

Mr. OLVER. That does not surprise me.

You mention in the use of disinfectants what are the variety of things for instance that you can get from chlorine. I suppose there are lots of other disinfectants you can use.

Dr. HUGGETT. Yes, sir.

Mr. OLVER. Would you call the pathology that would come from the over-concentration of some one of these disinfectant by-products a "water-borne disease?"

Dr. HUGGETT. Yes, sir—

Mr. OLVER. Or do those only come from microorganisms?

Dr. HUGGETT. I think that in the short—I think that one needs to take into account the time frame here. The effects of disinfection by-products are such things—that we fear, and we know in some cases are things like cancer.

The things that we worry about more from microbes are intestinal-like diseases, or giardia, of coliform. So there is a different pathology involved.

One takes a long time to come to fruition, and one is quite short.

Mr. OLVER. So you probably do not use the same terminology for those.

Dr. HUGGETT. That's correct.

Mr. OLVER. Because my impression is that in your testimony, and I do not find the exact statement, but I find it alluded to in a number of instances, that you really do not know enough about the relationship between waterborne disease and disease-causing microorganisms, microorganisms, organisms, whatever it is, whether it be—I am not sure how we term "virus" in this instance, as you talk about viruses being rather important in one section.

Now it seems to me that if we do not have any of the disease-causing microorganisms, organisms, or whatever, in the water, we are not going to have any waterborne disease.

Dr. HUGGETT. That is correct.

Mr. OLVER. What is it that we do not know about these? And if it is easier to know—is it easier, or is it more complicated because of the long-term aspects to know what the effects of the disinfectant, the uses of the various disinfectants that we might use, and what might be the by-products of that?

What is it that we do not know about this? It seems to me it ought to be some sort of a nearly direct relationship with perhaps thresholds of some sort.

Dr. HUGGETT. Let me give you an example. You have hit on a very important thing.

That is, it gets back to relative risk. If we do not use disinfection and there are organisms present such as giardia, such as *Cryptosporidium*, some of the viruses and bacteria, then you will definitely have disease. We know that.

If you do use disinfection, you create these by-products. What you have is natural organic material in the water coming in. When

you add chlorine, a very strong oxidant which kills bacteria, at the same time it combines with natural organic matter to make these disinfection by-products, as we call them.

So some of these cause cancer. So you have the tradeoff of the risk of disease from the waterborne pathogens relative to the risk of the disinfection by-products.

Now to be more specific, in the case of *Cryptosporidium* we know for at least one strain of *Cryptosporidium* roughly what the dose is that is required to make you sick. What we do not know is how to detect it in an accurate way in the drinking water.

Mr. OLVER. How common is "*Cryptosporidium*?"

Dr. HUGGETT. Sir?

Mr. OLVER. How common is *Cryptosporidium*?

Dr. HUGGETT. It is very, very common, sir.

Mr. OLVER. Why did we have an outbreak in Milwaukee?

Dr. HUGGETT. Why?

Mr. OLVER. Yes.

Dr. HUGGETT. Well, I can't tell you all of the details because—

Mr. OLVER. There must have been a bloom of *Cryptosporidium*. Is it in all surface drinking water at some level, do we know?

Dr. HUGGETT. I would not go so far as to say it is in all drinking water, but it is extremely common. There is a threshold, I think—

Mr. OLVER. What does it come from?

Dr. HUGGETT. It comes from animals such as feedlots. And that, I believe, was one of the sources in the case of Milwaukee.

Mr. OLVER. So we would not find it in surface waters if we did not have—but is it in all animals? Is it just common for all animals? Or is it something that occurs through manufactured feed-stocks?

Dr. HUGGETT. No, it is in other animals other than cattle.

Mr. OLVER. Other than cattle. So it might be all over, but at low—

Dr. HUGGETT. It is very common.

Mr. OLVER. Very common.

Dr. HUGGETT. It is very common.

Mr. OLVER. In all surface waters?

Dr. HUGGETT. No, sir. It is estimated that 65 to 97 percent of all surface water contains *Cryptosporidium*.

Mr. OLVER. At what levels? That is a very blunt instrument, "65 to 90 percent."

Dr. HUGGETT. It is very blunt.

Mr. OLVER. Do we know what the levels are where disease occurs? You say you know the threshold in the case of *Cryptosporidium*, but how many of those instances are there, and what order of magnitude less than the amount which is the disease threshold in the *Cryptosporidium*?

Dr. HUGGETT. The lowest dose in the case of *Cryptosporidium* was 30 spores per liter. The average was 130.

Mr. OLVER. In Milwaukee?

Dr. HUGGETT. No, sir. This was controlled laboratory experiments with humans to do this. Now *Cryptosporidium* causes a disease, *Cryptosporidiosis*.

With a healthy human, you recover. In fact, you may have had it yourself and called it intestinal flu. It is often undiagnosed, misdiagnosed. A healthy human will recover.

Unfortunately, many humans are not healthy, as you well know. People undergoing transplant therapy, or cancer therapy, or those with otherwise compromised immune systems such as AIDS, are highly susceptible to Cryptosporidiosis and may die.

Mr. OLIVER. All right. Well, look, I am not going to be likely to question the threshold that you have given of somewhere between 30 and whatever the number was that causes disease, but I would be very interested to know, if you know it, that when you say that 65 to 97 percent of all waters have *Cryptosporidium* in them, what is the level that you think it is present in those waters?

I mean, I do not even know what the detection level is that we area dealing with. In many of these instances it is a question of how much we have been able to detect by newer methods in the last decade or two. We now find that we can detect parts per billion where we could not even detect more than parts per million at a previous time.

So for most lay people it is—to know that relationship of what this danger is, and what this risk is, is exceptionally difficult to assimilate.

Dr. HUGGETT. Yes, sir.

Relative to the detection level, we can see one spore, which is what it takes. You know, it is not a chemical, so it is a particle. It is on the order of 5 microns.

Mr. OLVER. How are we detecting one spore at 5 microns?

Dr. HUGGETT. Electron microscopy.

Mr. OLVER. Electron Microscopy.

Dr. HUGGETT. And we are also using a DNA probes. It is very advanced work. It is very difficult. This is why we are expending so much effort.

Right now it takes days to weeks to analyze for *Cryptosporidium*. By the time you analyze it, it is too late. So that is why we are working so hard.

Mr. OLVER. At a concentration of one spore in how much a little liter?

Dr. HUGGETT. one.

Mr. OLVER. How much a liter? One spore per liter?

Dr. HUGGETT. Yes, sir.

Mr. ROHRABACHER. Thank you very much, Dr. Huggett.

Just to make this a little understandable, is bottled water safer than tap water?

Dr. HUGGETT. Which tap water?

[Laughter.]

Mr. ROHRABACHER. Well how about say in our—how about in Orange County where I came from?

Dr. HUGGETT. I have no idea about the water there, but I can tell you that—what was that about Washington, DC.?

I think it is a mistake to think all water systems are squeaky clean.

Mr. ROHRABACHER. Is generally bottled water safer to drink than—

Dr. HUGGETT. I have no information on that, sir.

Mr. ROHRABACHER. What about you?

Mr. HUBBS. I would argue that is not the case.

There are two points here. One of them is that are not talking about "safe" or "safer." We are talking about a degree of risk that I think was alluded to earlier as quite low in the first place.

The drinking water industry is extremely regulated by EPA, thank you very much, as well it should be. We are protecting our public.

The bottled water industry is regulated under a different agency.

Dr. HUGGETT. It is not regulated by EPA.

Mr. ROHRABACHER. I just noticed that the bottled water sometimes tastes better than the water I am getting out of tap. Is this just sort of psychological?

Mr. HUBBS. It could be.

[Laughter.]

Mr. HUBBS. It is difficult to determine.

But I think the point is that a well-regulated water supply is safe to drink—as safe as a bottled water supply, but I think more regulated than a bottled water supply. And, by inference, yes, probably safer.

Mr. ROHRABACHER. Are they getting the spores out of them when they put it in the bottle?

Dr. HUGGETT. Some do. Some do not filter. Not all bottled waters are treated similarly. Some come straight from a source. Some are filtered. Some come from your public water supply and are put into bottles. A great deal comes from that type of water supply.

Mr. ROHRABACHER. I know when I was visiting Mexico, that that is what they used to do. "Bottled water" right straight from the tap.

Mr. HUBBS. Different regulatory agencies.

Mr. ROHRABACHER. Right.

All right. With that, Mr. Roemer has a couple more questions and then we will adjourn the hearing.

Mr. ROEMER. I would like to come back to the Cryptosporidium questions that Mr. Olver was asking.

Did we know much about Cryptosporidium before the Milwaukee outbreak, that it could be as devastating as what we found in Milwaukee?

How many deaths do you attribute to what happened in Milwaukee?

Dr. HUGGETT. I think that the Milwaukee incident was a great wake-up call when it comes to waterborne disease. It is difficult to tell exactly how many deaths. We estimate approximately 100, but 400,000 people were made sick.

It is my understanding, as well, that just this week in Worster, Massachusetts, I believe, the CDC announced an outbreak that once was considered intestinal flu last summer was actually Cryptosporidiosis, just this week.

Mr. ROEMER. Now when we try to treat that water and disinfect that water, you mentioned two different ways to do it, Chlorine and ozonation?

Explain to me in layman's terms a little bit more about ozonation? Is it more expensive? There are some effects that would be very detrimental to humans, as well, too?

What are we looking at in terms of doing more research to find a safer method to disinfect, if *Cryptosporidium* is going to continue to be a problem for us?

Dr. HUGGETT. *Cryptosporidium* is particularly resistant to the common treatment of chlorine. So you have to jack the chlorine levels quite high in order to kill the *Cryptosporidium*, and there are all kinds of problems with tastes, and additional by-products.

Ozone is—

Mr. ROEMER. But the by-products are not necessarily cancerous like what might be with ozonation?

Dr. HUGGETT. Well, there are. There are carcinogens formed with chlorine.

Mr. ROEMER. Okay.

Dr. HUGGETT. Of course the levels are the important thing. It is not just the fact that the hazard is that it can cause cancer. It is the concentration that becomes very important, or the dose.

In the case of Ozone, it is relatively new to us and therefore we have not—we do not have the background on the by-products of ozonation, some of which could be harmful to humans.

Mr. ROEMER. How much more expensive is ozonation than chlorine?

Dr. HUGGETT. I do not have that answer. I do know that, I believe quite a large part of California is now using ozone, the southern part of California.

The ozone creates another interesting problem. That is, that it breaks down the organic matter, the natural organic matter in water, and that brown—or degraded, if you will, organic matter than becomes an energy source or food, if you want to think of it that way, for bacteria and microbes that actually grow within the water system, the distribution system.

Mr. ROEMER. Okay. Thank you—I would be happy to yield to the gentleman.

Mr. ROHRBACHER. Mr. Hubbs had something he wanted to add.

Mr. HUBBS. Yes. We did discuss disinfectants and *Cryptosporidium*, but I would like to make a point that *Cryptosporidium* and giardia, those types of compounds, are most effectively removed by coagulation and filtration. That is the focus of the drinking water industry, to make sure that we improve those technologies, as well as our disinfection technologies.

And the other point I would very much like to make is that we are talking about *Cryptosporidium* because that is the organism that we are concerned about today.

Ten years ago it was something else, and ten years from now it will be something else. We should talk about pathogens. We should talk about basic treatment, and not individual compounds or individual microorganisms.

Mr. ROHRBACHER. Okay. Thank you very much.

Mr. Olver, please, go right ahead.

Mr. OLVER. I am very grateful for that last comment, because one gets very focused upon one thing, what happens to have happened, and I imagine that there are lots of other items that are sitting in the very potential drinking water that *Cryptosporidium* has been identified in that are just not quite a threshold level at the particular time and are not yet of particular concern.

I wanted to ask you in this *Cryptosporidium* case, to get back to that, is that a bacteria, or is that a protozoan? Is that a virus? What are we talking about here?

Dr. HUGGETT. It is a protozoan.

Mr. OLVER. Okay. Now you are saying—what methods are we using—

Mr. ROHRABACHER. Mr. Olver understands that because he is a professor.

Mr. OLVER. Yes, well, once. You say chlorine is not particularly effective. What are we using? Are we using flocculation—I guess flocculation. Is that particularly effective with the *Cryptosporidium*? Or is that—go ahead.

Mr. HUBBS. The drinking water community has focused most of efforts recently on how we can improve our standard treatment in our conventional water treatment plans for removals of *Cryptosporidium* and giardia.

The best techniques we have available to us now are very effective coagulation and filtration.

Mr. OLVER. Coagulation and filtration, not “flocculation.”

Mr. HUBBS. I short-term “coagulation” to be the process of chemical addition, flocculation, sedimentation. So I put—

Mr. OLVER. Well that is interesting because my impression is not so long ago that we were being deliberately steered away from those kinds of mechanisms and more toward the chemical reaction mechanisms.

Mr. HUBBS. I would think that in the bulk of the water utilities across the United States, conventional treatment is maintained. Elimination of the sedimentation step is typical in very high-quality waters, and that is simply because there is a solids’ removal phase.

That solids’ removal phase that would take place in sedimentation will instead take place in a filter.

Mr. ROEMER. Thank you.

Mr. ROHRABACHER. Thank you, Mr. Roemer, and we will end this hearing on the note that *Cryptosporidium* happens.

[Laughter.]

Mr. ROHRABACHER. With that, this hearing is adjourned.

[Whereupon, at 1:38 p.m., the hearing was adjourned.]

[The following information was received for the record:]

APPENDIX 1-ADDITIONAL STATEMENTS FOR THE RECORD



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TESTIMONY

by

Scott Sklar
Executive Director

submitted to

COMMITTEE ON SCIENCE
SUBCOMMITTEE ON ENERGY AND ENVIRONMENT
U.S. HOUSE OF REPRESENTATIVES

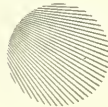
on

FISCAL YEAR 1997 BUDGET AUTHORIZATION
for
SOLAR ENERGY (AND RELATED) PROGRAMS
of the

U.S. DEPARTMENT OF ENERGY

March 21, 1996

Washington, DC



SOLAR ENERGY INDUSTRIES ASSOCIATION

Introduction

The Solar Energy Industries Association (SEIA) is the national trade organization of the photovoltaics and solar thermal manufacturers and component suppliers, composed of over 550 companies, 400 of whom are members of SEIA's affiliated state and regional chapters. Today's U.S. solar energy industries are comprised of manufacturers, component suppliers, distributors, and installers involved in the development and deployment of a wide variety of solar energy systems, and includes hundreds of small entrepreneurial businesses across the nation as well as Fortune 500 corporations.

SEIA is recommending a solar research & development budget at the U.S. Department of Energy for FY 1997 that is roughly equivalent to FY 1995 funding levels. SEIA believes this is the minimum acceptable level of the federal research program in order to insure that the U.S. global technical leadership results in sustainable businesses. In other words, let us not allow the U.S. to fall into the old path of "VCR Syndrome," where the U.S. invents technology only to lose out on the hundreds of thousands of jobs and millions of dollars of profits on commercializing these technologies.

The federal solar programs are well managed, have the highest proportion of industry cost-shared activity, are on time, and on budget. Our industry, which is primarily small business, has consistently met its obligations -- a significant achievement for a small, emerging industry.

The member companies of SEIA have one basic request to Congress: stick with the commitments made to our industries which began under the Bush Administration and continued under the Clinton Administration. We have and will continue to meet the commitments we made to the federal government, to the American people.

Summary

I am here to today to make three points, which together should compel the Subcommittee to support the solar energy programs:

1. Federal spending for solar energy technology development, especially spending that is cost-shared with the private sector, is a wise investment that pays off.
2. Failure to fund the solar energy programs at critical levels would represent nothing less than abrogation on the part of the U.S. government of multi-year commitments to U.S. industry.
3. Solar energy budget cuts along the lines of those made in FY 1996 will result in unrecapable co-investment and will drive private investment from our emerging industries.

SOLAR ENERGY INDUSTRIES ASSOCIATION

SEIA's FY 1997 Appropriations Recommendations

SEIA's FY 1997 budget recommendations for the U.S. DOE's solar energy programs, outlined in detail in Attachment A, were crafted by the solar industry in consultation with state governments, the research community, and utility and building industry leaders to result in the most cost-effective leveraging of federal dollars to bridge the gap between research and commercial viability.

The following table summarizes our basic recommendations:

SEIA'S FY 1997 SOLAR ENERGY R&D APPROPRIATIONS RECOMMENDATIONS (\$ millions)	
Core Technology Programs	
Photovoltaic Energy Programs	92.2
Solar Thermal (Electric & Industrial) Programs	32.5
Solar Buildings Technology Research	6.25
Other Programs	
Solar International	9.0
Renewable Energy Production Incentive	5.0
Resource Assessment	4.0
FEMP (IHEM)	3.5
Energy Storage	5.0
Hydrogen (through renewable energy resources)	5.0

Photovoltaic (PV) Programs

During the last several months, ground-breaking ceremonies for three automated photovoltaic module manufacturing plants were conducted in Michigan, Virginia, and Washington and three more are expected to be launched before the end of 1996. Two new U.S. manufacturing ventures overseas were announced for Russia and South Africa. This represents the largest growth in manufacturing capacity in the history of photovoltaics and American industry is the driving force in the expansion. The federal government has been instrumental in driving this growth trend by sharing the risk with industry in the development of new manufacturing processes, materials, and by facilitating domestic market engagement.

These phenomenal advances in manufacturing capacity came as no surprise to those of U.S. in the industry and they have occurred for three primary reasons. First, the opportunities in the international markets are booming, with two billion people currently without electricity and another billion with less than 10 hours of reliable power per day. International markets,

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primarily in the developing world, already account for over 70 percent of U.S. photovoltaics exports. With the new multilateral bank loans for rural electrification in India and Indonesia to utilize solar technology as a method of sustainable economic development, these markets are prime for our industry. International markets, on average, have grown by 30 percent annually over the last three years, a trend which is expected to continue through this decade. However, competition from our European and Asian counterparts is stiffening as a result of higher levels of their governments' investment and support. If the American PV industry is to maintain its world leadership position, the existing technology and market development partnerships that have been forged with the U.S. government will need to be continued to meet these challenges.

Second, these new manufacturing facilities are the result of a significant departure from the business-as-usual government research and development programs. During the Bush Administration, the PV industry embarked on a cost-shared PV Manufacturing Initiative (PVMaT) program in conjunction with the Department of Energy to overcome technological hurdles to scale-up manufacturing. The program was designed to build on the Japanese experience that proved the effectiveness of reducing costs through more efficient manufacturing techniques, rather than through pure research on cell efficiencies. While the manufacturing efficiency program has led to stunning successes in lowering production costs, its job is not complete. American industry has re-invested its revenues and has been able to attract venture capital based on the expectation that its government would follow through on its promise to assume some of the technology development risk. However, budget shortfalls have reduced the scope and term of the PV-MaT initiative and threaten the survival of many companies that invested in its merit.

Third, during the Clinton Administration, the PV industry entered into two cost-shared programs with the federal government designed to build market confidence in the electric utility and building industry sectors. The PV-COMPACT and PV-BONUS programs are critical to the evolution of aggregated domestic markets and have provided instant credibility for the PV industry in the eyes of the finance and banking communities that have provided the necessary capital for manufacturing facility construction. However, recent budget cuts have threatened these programs as well.

The PV-COMPACT program established a cost-shared market acceleration mechanism by engaging over 90 electric utilities (representing half of the U.S. generation capacity) and formed the Utility Photovoltaic Group (UPVG) with support from state regulators and state consumer advocates. The PV-COMPACT approach has been to promote interest and investment by the electric utility industry in photovoltaic technology with a goal of building a sustainable market aggregation program. Only in this way will the technical capacity be built in the electric utility sector necessary for multi-year, mass quantity purchases.

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Similarly, PV-BONUS was conceived to drive the development of innovative PV products for the commercial and residential building sector. As a result of the accomplishments of PV BONUS, one of the new American PV manufacturing facilities will produce PV roofing shingles. In addition, PV BONUS has enabled U.S. industry to develop PV window glass for commercial buildings, as well as innovative PV roofing and siding products. The cost-shared federal investment in PV building technologies has produced these innovations which will flow into the marketplace over the next decade.

SEIA is requesting a \$92.2 million program, which represents level funding with the FY 1995 appropriation. However, SEIA's recommendation differs substantively from both the FY 1995 and the FY 1996 funding profiles for solar energy in that it calls for increased funding for cost-sharing agreements for the PV manufacturing efficiency program to maintain the momentum in driving new approaches to automation. It accomplishes this by:

- increasing the PV COMPACT and PV BONUS cost-shared market technical experience programs to drive innovative new technologies into conventional market validation programs;
- increasing the funding for the Thin Film Partnership Program, which is cost-shared with the U.S. industry to drive the development of new materials in this unique applied R&D program that has kept the U.S. a global technology leader; and
- increasing a strategic research program to "harvest" the best technical innovations in an interactive process between U.S. industry, national laboratories and universities.

SEIA will not explicitly endorse generic research programs which have little interplay with the PV industry's strategic needs. As federal programs are being cut, U.S. industry cannot afford this luxury. We believe that any generic research activity funded with PV Program dollars that cannot translate its value to industry may have to be dispensed with for now. Advances in generic R&D can be achieved elsewhere in the federal government and in fact, may hurt U.S. industries' competitive edge by fulfilling the world's generic research needs without providing benefit to the U.S. taxpayer.

SEIA has suggested that international program activities within the PV programs be dropped except in cases where they provide technical expertise to multilateral funding agencies or procurement officials administering international tenders. Again, generic international activities should be carried out elsewhere in the DOE budget or via other federal agencies such as AID or the export assistance agencies (e.g., TDA, OPIC, EXIMBANK).

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The DOE photovoltaics programs have produced measurable results and have been the shining star of DOE and the renewable energy program. The DOE PV Program has been the best cost-shared and most highly-leveraged federal R&D program in DOE. In addition, the PV program is one of the most innovative and productive federal programs due to its willingness to confront the technological issues "outside the box," and has been effective in promoting industry's goals and global market strategies. If SELA's recommendations are followed, the nation will reap the following benefits:

- a higher number of high-efficiency manufacturing facilities as a direct result of the R&D programs compared to any other technology program at DOE;
- a 10 percent increase in use of photovoltaics by the electric utility and building sectors; and
- preservation of the global dominance of U.S. industry in new manufacturing, new technology, and innovative systems.

The solar energy industries are proud of their accomplishments, made possible with your support, and we urge that it be continued until it is completed. Our industry has put its money where its mouth is, so to speak, and we hope that the U.S. government will continue to be the reliable partner and will sustain its commitment to the advancement of photovoltaics.

Solar Thermal Electric and Industrial Programs

In calendar year 1995, four major events characterized the success of the Solar Thermal Programs:

- The grand opening of the first ever solar/dish engine manufacturing facility (Texas), the unveiling of the Solar Two central receiver, the prototype for solar-only baseload power plants;
- The creation of an economic development zone for 1,000 megawatts of large scale, privately-financed solar electric projects at the Nevada Test Site called the Solar Enterprise Zone; and
- A rejuvenation of international markets for solar thermal electric technologies, with over 800 megawatts of projects under discussion.

These milestones are a direct result of the new directions this R&D program took under the Bush Administration and continued under the Clinton Administration. While the United States led the

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world in first generation solar thermal electric technologies in the 1980s -- 354 megawatts of commercial solar thermal electric plants were installed and continue to operate reliably -- falling fossil fuel prices required the development of more efficient technologies and designs.

So, in the early 1990s, DOE entered into partnerships with the solar energy industries to develop next-generation solar thermal electric technologies by the late 1990s, leading to a series of 50-50 cost shared, five-year joint ventures which have generated more than \$150 million in commitments from the private sector. We are midway through these joint ventures and they have been a tremendous success. They are all on-time, on-budget and meeting original technical and economic milestones:

- Construction is complete on the Solar Two central receiver, and it is entering its 3-year operating and testing phase. Solar Two was developed by an eight-utility consortium and is a key milestone towards commercial scale, solar-only baseload power plants by the end of the decade.
- The solar dish engine joint ventures are on track with companies installing over 20 demonstration units at utility sites in 1996. As mentioned earlier, one company has opened its first manufacturing facility in Texas, and expects to sell fully commercial units by late 1997. The other solar dish/engine team expects commercial production in late 1997 or early 1998.

SEIA's FY 1997 budget recommendation is \$32.5 million, which is essentially on par with the amount appropriated in FY 1995, and is essential to keep this effective program on course to:

- maintain original commitments to complete the three solar dish engine joint ventures, which will include transforming demonstration units into prototypes ready for mass manufacturing;
- maintain the original commitment for a three year test and evaluation phase at Solar Two. Already, an industrial consortium is developing plans for commercial scale plants in domestic and export markets, but their ability to move forward hinges on developing operating experience and data at Solar Two;
- maintain a basic R&D program which will allow the continuation of projects which enhance the durability, performance, and reduce the cost of system components in support of the joint venture projects; and
- assist U.S. firms in pursuit of project opportunities in export markets and the Solar Enterprise Zone.

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The Solar Thermal Power programs have been exemplary in driving industry cost sharing, and keeping all of its projects on time and on budget. The program insures participation of a wide variety of industrial firms, over 25 utilities, and a range of state and local governments. This program represents a model of how federal technology programs should be run.

If the Subcommittee supports the solar energy industries' FY 1997 recommendations, DOE will be able to fulfill its side of the bargain in these five-year joint venture efforts to develop next generation technologies. As a result, U.S. firms will be able to capture a significant share of the over \$1 billion and growing export market for solar thermal electric technologies because they will have the most cost effective technologies available. Successful efforts are projected to lead to 40,000 U.S. jobs by 2002-2005. If DOE cannot maintain its commitments, these projects and jobs will, without a doubt, go to German, Israeli, Japanese, and Australian companies.

Solar Building Programs

With solar thermal technologies installed on over 1.5 million buildings today, displacing over 1,000 megawatts of energy and the building sector representing over 35% of this nation's annual energy consumption, this small program deserves continued enthusiastic support from Congress.

The Solar Buildings program was cut by 60% in FY 1996. SELA's FY 1997 recommendation of \$4.5 million represents level funding from the FY 1995 appropriation, and will ensure that the standards certification, utility initiatives, and federal and state facility technical assistance programs are continued.

The accomplishments of the program to date have been:

- the development of one of the few national technology performance and certification standards now being utilized by utilities and state governments around the nation;
- the creation of the Utility Solar Water Heating Initiative (US H₂O), a collaborative effort leveraged by both municipal and investor-owned utilities, aimed at assisting utilities in establishing programs that support the installation of solar thermal technologies for buildings;
- the establishment of technical validation and assistance mechanisms that provide support for government procurement officials on both state and federal levels; and the continuation of focused market-oriented R&D efforts that have led to major technology innovations in solar space-heating applications.

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While small programs seem to suffer the brunt of recent budget cutting, it is often the small programs that cost-effectively leverage private resources to create the highest value results. This is clearly the case with the Solar Buildings program. First, the biggest market barrier for solar building technologies has been a technical one in that end-users, whether they be utilities or building owners, need energy savings "rules of thumb" from independent third parties. In this case, the industry along with universities, national laboratory experts and the Florida Solar Energy Center, have developed a set of reliable certification standards for solar thermal building components and systems. This certification program, in its final stages of development, now must be integrated into a myriad of international, federal, state, and local government standards programs.

Second, to scale-up manufacturing the industry needs aggregated purchases from the utility industry and its suppliers. The utility and energy service industries are looking to solar water heating technologies as a major opportunity to retain market share, offset peak demand, and address customer concerns with respect to energy conservation. The Solar Buildings program has recently supported the development of key analytic tools and model technology validation projects resulting in increasing interest in solar water heating among utilities. For example, the Sacramento Municipal Utility District (SMUD) has initiated a program leading to over 1,000 solar water heaters in their service territory in a two-year period. Other utilities, such as General Public Utilities, Green Mountain Power, Lakeland Electric, and Wisconsin Public Service, have begun to follow suit. Continued support for this program is crucial to building on recent successes of the utility initiative, and to realizing the potential of this technology in the utility and energy services markets. The SEIA FY 1997 budget recommendation drops the pure research component of the program and instead recommends a more applied research R&D program conducted through universities and the U.S. industry.

If the Subcommittee supports a strong program at level FY 1995 levels rather than at the close-out level driven at the last minute in FY 1996, SEIA believes the following results can be promised:

- five more utility solar water heating programs (all at their own expense as current programs are financed);
- several large procurements of solar building technologies in the federal and state government sectors; and
- three new product/application announcements in 1997 which will significantly expand the markets for solar technologies in the commercial building sector.

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Small programs of this nature took the brunt of the budget cuts in FY 1996. SEIA believes these were short-sighted cuts in that no formal dialogue was developed on the consequences of these actions. If these cuts are maintained in FY 1997, we will lose the brain trust and capability which will seriously under cut the overall federal renewable energy R&D programs.

This highly leveraged but relatively small program is critical to the U.S. solar building technology industry as it competes with highly subsidized competition in growing international markets. While the U.S. still leads the world in technology development, foreign competitors are quickly gaining the upper-hand overseas and threatening our competitive strength.

Related Programs:

The Solar Energy Industries Association has been a proactive supporter of key cross-cutting R&D programs at the FY 1995 appropriated levels. SEIA wants the Subcommittee to note that only the federal government can support these kind of efforts in that they require resources beyond individual companies or industry sectors. These programs deserve support because they can truly leverage U.S. international competitive advantage and yield a wide range of assets to many industries and endusers.

Solar International: Three distinct activities fall under the Solar International Programs, all of which assist U.S. manufactured renewable energy technologies in maintaining their global dominance. No less than \$2.5 million of any appropriation within this line-item should go to support the federal interagency board, the Committee on Renewable Energy Commerce and Trade (CORECT). This program, signed into law by President Reagan, insures that all 13 participating federal agencies and entities coordinate proactively together to promote renewable energy exports. The program has developed several new models, including a unified export financing form, prefeasibility financing entity, multilateral bank bundling programs, and identification of over \$1 billion of projects by U.S. industry, primarily in South Asia and Latin America, but in other countries as well.

"America's 21st Century," a program established under the Bush Administration, was not supported in FY 1996 but must be reinstituted in FY 1997 if we are to drive projects in our hemisphere. Finally, the Joint Implementation program was truly begun in FY 1996 with industry and non-government organizations partnering in driving projects. This is a worthy program as long as it maintains its project focus with an emphasis on renewable energy and energy efficiency.

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International markets for solar energy systems are virtually exploding, due to several key market trends. Most notably, solar energy is already one of the lowest cost options available to developing countries that cannot afford to build large, expensive centralized power generation facilities with elaborate distribution systems. Solar energy systems allow developing nations to use indigenous resources, obviating the need to import energy and lose precious foreign exchange. Solar energy is the lowest cost option compared to electric line extension. Solar energy systems are deployed quickly (within days), are easy to maintain, and easy to expand when additional power is needed.

Resource Assessment: This small program deserves restoration in that it provides resource mapping of renewable resources globally. If endusers are not able to ascertain the quality of their renewable resource, they will either not use or incorrectly specify equipment. This activity is the underpinning of the entire renewable energy R&D program and must be restored to FY 1995 funding levels.

Energy Storage Systems: All renewable energy resources need to incorporate unique storage applications and this small program needs to be restored to FY 1995 funding levels. Use of batteries, see-through capacitors, harmonics equipment for hybrid renewable/battery/conventional energy systems represent the kind of innovative research and applications necessary. Again this is another kind of underpinning activity to all renewable energy technologies and its program needs restoration.

Hydrogen: This program is relatively recent, created to lead us to the sustainable energy economy this country must have after the year 2000. Although this program has little interaction with the renewable energy industries, SEIA supports it with the proviso that it be redirected to become a more collaborative program with industry (including cost-shared projects), and that it be subject to solid performance-based metrics.

Federal Energy Management Program: The Department of Energy's In-House Energy Management (IHEM) Program, under the direction of the Federal Energy Management Program, has previously provided the necessary resources and services to reduce energy consumption, improve energy efficiency, and reduce utility costs throughout the Department's facilities and operations. The IHEM Program is currently saving the Department over \$100 million annually through its investments in energy efficiency and renewable energy projects. The IHEM Program has had a return on investment of over 25 percent, with a net return of \$5 in energy or water savings for each \$1 invested at DOE facilities, not including the additional environmental benefits. Despite this success, there is still considerably more potential energy savings.

The Solar Energy Industries Association supports the continuation and funding of this IHEM Program as both a means of Federal budget deficit reduction and as a visible demonstration of

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the success of our energy efficient and renewable technologies. Even at reduced funding levels, this program needs to be continued to emphasize energy management within the Department, by accomplishing these projects through leveraging with non-Federal resources such as utility rebates and private-sector financing. SELA strongly recommends the Federal Energy Management Program work cooperatively with the Office of Utility Technologies on a \$3.5 million effort for a large-scale increase in the use of solar energy systems in the Federal sector. This effort not only addresses the President's call for "significantly increasing" the use of solar and renewables in Federal facilities, but would lead by example and signal the industry that the large Federal sector can serve as the foundation for major market expansion.

Conclusion

Our nation's economic strength can be attributed indisputably to its ability to develop, market, and sell emerging, innovative technologies, often with the assistance of a U.S. government investment in civilian technology development activities. The government's past decisions to invest in a wide range of new technologies has been based, in large part, on the proven recognition that our economy, as it is currently structured, favors private investments that pay off only in the relative short-term, at the expense of investments in R&D that take longer to yield a return on investment. It is also based on the recognition that private enterprise does not and cannot always look out for a nation's economic and energy security. The notion that there is a legitimate and worthwhile federal role in helping to incubate emerging technology companies, to bridge the gap between research and market acceptance, is not new, and should not be casually discarded without serious consideration of the negative consequences to our nation's ability to compete effectively and successfully in the potentially multi-billion dollar international markets. *A vast amount of thoughtful discourse and hard experience has led to the conclusion that neither U.S. industry nor the government alone can bear the entire risk and burden of market-relevant technology development.* I am personally concerned that this wealth of knowledge and wisdom is being cast to the winds of budget cutting.

Thank you.

STATEMENT
Rear Admiral Harley D. Nygren
Congressional Hearings Concerning
The Abolishment of The NOAA Corps

Dear Mr. Chairman:

When the National Oceanic and Atmospheric Administration was formed in 1970 I was appointed as the first Director of the NOAA Commissioned Officer Corps. I served for ten years in that position, through two Administrations, and have followed the fate of this organization since I retired fifteen years ago. I am a Professional Engineer, a Certified Hydrographer, and a member of a number of Professional organizations. I have attached a brief biography to establish my credibility to comment on the several proposals to abolish the NOAA Corps.

I have no problem with the Government periodically reviewing what it does and the way it does it. This is necessary, but it is also imperative that good data be used in formulating new proposals, and that impeccable logic be used. The suggestions to abolish the NOAA Corps stem from several common roots and different motivations. It is not necessary to reconstruct these, except to identify the several fallacies which are common to all of them. Without a proper definition of the problem a reasonable solution is impossible.

The House Resource Committee has stated that because the government owned NOAA fleet may be phased out, the officers of the NOAA Corps will no longer be needed. The Administration quotes the National Policy Review as its rationale for destroying the Corps. The NPR is woefully short of data, and the President is very ignorant of the problem as he demonstrated in comments at a Rose Garden press conference where he discussed the NPR. A report of the National Academy of Engineering Marine Board has provided a mechanism for industry representatives to suggest the abolishment of the Corps, and the Inspector General of the Department of Commerce has listed a series of reports on contracting for marine services as a possible reason for abolishing the Corps.

All of these sources fail to note that the Mission of The NOAA Corps far transcends the management of the NOAA fleet. Should the NOAA fleet disappear tomorrow the need for project and program managers capable of carrying NOAA's projects to the field and to sea would still exist. This issue has been confused by the merging of the duties of the Director of The NOAA Corps and the head of the Office of NOAA Corps Operations. It is only in recent years that the Director of The NOAA Corps had any direct line responsibility for the overall management of the NOAA fleet. When NOAA was created we merged six small groups of vessels into one fleet. The utilization of the resources of

this fleet was determined by a Fleet Allocation Council, which the Director of The NOAA Corps periodically chaired. The organization of the Office of NOAA Corps Operations blurred the difference between the duties of the fleet manager and the head of the personnel system which is the NOAA Corps.

The linking of these two functions, logical enough by one way of thinking, leads to the huge perceptual conclusion that the abolishment of the fleet means the abolishment of the Corps, when this does not at all follow, if you believe the official Mission Statement of The NOAA Corps, which I have attached. As a NOAA Corps project officer I have utilized NOAA vessels, Navy vessels, Coast Guard vessels, University vessels, foreign ships, rented boats, chartered ships, surplus equipment, and even stolen vessels, in a sense. Project accomplishment was the goal, and ships were merely tools to that end, not ends in themselves. The idea that the overall umbrella of "contracting" will obviate the need for the Corps is, therefore, spurious.

The government should contract for services and products as necessary to accomplish its mission. A proper mix of contracting and in-house capability is necessary, however, for the government to retain a capability to administer its responsibilities. If the contract is to be for products, for which the government assumes liability, the government must have the capability to administer that contract in a way which protects itself. If the contract is for services, oversight of the provision of the services is required. Neither of these functions is outside of the mission of the NOAA Corps, and both will exist if the government owned fleet disappears tomorrow. The US Marine Corps operates a fleet of helicopters in the performance of its mission. Should that fleet disappear tomorrow because of obsolescence or a change in technology it would be unthinkable to suggest that the Marine Corps should be abolished, unless its mission was totally changed. So, too, with the NOAA Corps. Without reference to its Mission, any suggestions for abolishment hang on thin air.

Whenever Congress considers reorganizations it must ask about the costs and the benefits of the proposed plan. In this case this has not been done in a way with any integrity. The few cost studies that are available to the public tend to show two things. One, the costs of operating the NOAA ships and aircraft are comparable with those of other entities. This is an area fraught with difficulty because of the differing modes used. It should be sufficient to point out that the government does not pay taxes, does not insure its vessels or aircraft, and does not pay dividends to share holders. Other than that it deals with the same unions, pays its crews comparably, except for the officers, repairs in the same shipyards, and enjoys the same costs of consumables. Industry is free, to an extent, of government red tape in procurement, but must accommodate to the strict requirements of the U.S. Coast Guard. So I would suggest that inasmuch as contracting seems to be a priority of Congress, that it do this as matter of National Policy, and not lean too hard on tortured cost analyses. I would emphasize that the military based pay of NOAA Corps officers assigned aboard ship is in no way comparable to that of the marine industry. That this is so is regrettable. Aside from the vessel operating

costs, the NOAA Corps personnel system can also stand a favorable comparison with the classified Civil Service, which is proposed to replace it. This was demonstrated by a study performed by the Arthur Andersen Co. which we have attempted to bring to the attention of the Congress and others. Unfortunately, the Inspector General of Commerce has produced a number of papers which he maintains prove otherwise, and these we have challenged without exception.

NOAA has prepared a transition plan to take effect should it be possible for it to proceed with the abolishment of the NOAA Corps. Under the circumstances this is a good plan, but it is predicated on both the abolishment of the Corps and the provision of additional legislation to make that possible. What NOAA envisions is a transition to a new personnel system which will embody most of the capabilities of the institution of the NOAA Corps, but which will inevitably cost more, on a per capita basis. It is well worth noting that the proposed personnel system is comparable to what was in effect in 1917, before the commissioned corps structure was adopted. The 1997 budget already includes substantial costs for making the transition, as well as an indication of continued future costs. It is very difficult to make the case that an individual paid under the military pay scales is cheaper than a civil servant, unless you add in a number of illogical factors derived from DOD computations that do not necessarily apply to NOAA. Again I would press the Administration for a well defined computation of both costs and benefits of the abolishment of the Corps.

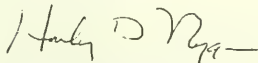
Those of us retired from the NOAA Corps have a legitimate interest in the preservation of our earned benefits. Should anyone doubt the basis for our concern I refer them to the original Chrysler Bill, which treated active duty officers very harshly, and which could be interpreted as affecting retired pay. Any tampering with legislation which has developed over eighty years is bound to be a risky business. The matter of entitlements is not one to be treated lightly, becoming a constitutional issue if handled callously. I trust that in their zeal to destroy this institution the members of Congress will remember their responsibilities to those who have served out their contracts and are now in the twilight of their lives.

Finally, I would stress that the rights of the serving officers are deserving of consideration. These young folks are possibly seeing their chosen careers truncated or finished, because of a desire that is difficult for them to comprehend. They have seen their organization attacked from several fronts for reasons that run from ignorance to greed to animus, and they don't understand it. Certainly, as I hope I have shown, the reasons publicly espoused for doing away with the Corps do not stand up, when measured against the Official Mission of The NOAA Corps, which, after all, should receive far more consideration than it has thus far.

I would appreciate very much your making this a part of the official record. It is apparent that the forces dedicated to the destruction of the NOAA Corps have, to date, received far more prominence than those whose goal has been the maintenance of good

government through superior service.

Very Respectfully,



Harley D. Nygren
Rear Admiral, NOAA
Retired

NOAA CORPS MISSION

The mission of the NOAA Corps is to provide officers technically competent to assume positions of leadership in NOAA's programs. Members of a uniformed service, they serve as officers of the Department of Commerce, or as military officers if transferred to the armed services during times of emergency. Discipline and flexibility are inherent in the Corps personnel system. NOAA officers are trained for positions of leadership and command in the operation of ships and aircraft; in the conduct of field projects on land, at and under the sea, and in the air; in the management of NOAA observational and support facilities; as members or leaders of research efforts; and in the management of various organizational elements throughout NOAA.

(ORIGIN AND DEVELOPMENT OF THE NOAA CORPS, U.S.D.O.C., NOAA, 1979)

BIOGRAPHICAL SUMMARY

Rear Admiral Harley D. Nygren

NOAA, Retired

Rear Admiral Harley D. Nygren, NOAA (Retired) was born in Seattle, Washington in 1924. He began his Government career in 1942 as a WS 1, laborer in an Army warehouse. At the age of 17 he enlisted in the U.S. Naval Reserve, was assigned to the wartime Navy College Training Program as an Apprentice Seaman. He received his commission as an Ensign USNR and the B.S. degree from the University of Washington in 1945. His last active duty tour was as Damage Control Officer on the target destroyer USS HUGHES, at Bikini, during the Atomic Bomb tests of 1946.

He returned to the University of Washington, and served for a year in the Submarine Battalion of the Organized Reserve while earning a B.S.M.E. degree. In September 1947 he joined the U.S. Coast & Geodetic Survey as a Deck Officer, and was commissioned as Ensign USC*GS in 1948. During his career Admiral Nygren served aboard numerous ships, but in particular the Survey Ships EXPLORER, PATHFINDER, PIONEER, SURVEYOR and HODGSON, in various capacities, including Oceanographer and Commanding Officer. He was also assigned to field parties conducting Hydrographic, Geodetic and Gravity studies. This included three years of assignment to the United States Arctic regions. At one time he was the Chief of a Geodetic Party assigned to the US Air Force Missile Test Center at Patrick AFB, Florida. Admiral Nygren was United States representative on the British Antarctic Survey Expedition in 1962, and was a member of the U.S. Inspection Team to Antarctica in 1970.

Twice a temporary Captain, Admiral Nygren was promoted in 1968 to the permanent rank of Captain, then to the temporary rank of Rear Admiral (Lower Half) in conjunction with his appointment as Associate Administrator of The Environmental Science Services Administration (ESSA). When NOAA was created he was promoted to the permanent rank of Rear Admiral (Upper Half), and was chosen as the first Director of the new NOAA Corps. He served for ten years in this position, through two Administrations, and retired in 1981 with 36 years active service and 38+ years of total service.

Admiral Nygren received commendations from the US Navy and the US Air Force. In 1961 he received the Karo Award of the Society of Military Engineers, a Unit Citation. He was awarded the Department of Commerce Gold Medal and the Department Bronze Medal. Admiral Nygren served on a number of panels of the original Interagency Committee on Oceanography and the Marine Council. He was a founding member of the Advisory Committee on Undersea Features of the Board on Geographic Names. He served many years on the Committee on The Delimitation of the US Coastline, as well as numerous other committees, panels and Task Forces.

He is a Fellow of The American Society of Civil Engineers, a Fellow of The Society of American Military Engineers, A Fellow of The Marine Technology Society, a Fellow of the Explorers Club, and a Fellow of The American Congress on Surveying and Mapping. He is Registered Professional Engineer (inactive) and a Certified Hydrographer.

Admiral Nygren resides in Vienna, Virginia with his wife Janice. Four sons are involved in marine related activities.



**Comments of the
Association of California Water Agencies
to the
Energy and Environment Subcommittee
Committee on Science
Unites State House of Representatives
on
Drinking Water Program
Research and Development Requirements**

ACWA's mission is to assist its members in promoting the development, management and reasonable beneficial use of good quality water at the lowest practical cost in an environmentally balanced manner.

Mr. Chairman:

These comments are submitted by the Association of California Water Agencies (ACWA) on behalf of its more than 400 public agency members in the State of California relative to the March 21, 1996 hearing on Drinking Water Program Research and Development Requirements conducted by the Energy and Environment Subcommittee of the House Committee on Science. ACWA's members are responsible for the delivery of about 90 percent of the water distributed in California for use in homes and business and on farms. Our members and the people of California they serve are significantly impacted by the nation's laws and regulations concerning drinking water. Those laws and regulations are important to helping our members achieve their mission of supplying high quality, safe and affordable water in all parts of the state.

We are particularly concerned that drinking water regulations help us assure that public health is protected effectively and that the requirements are affordable to consumers who must ultimately pay the costs involved. In that context, we believe it extremely important that regulatory decisions be based on sound, peer-reviewed scientific studies and data that assures action mandated on water suppliers are truly

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effective and needed, and that such mandates are cost-effective and reasonable.

Therefore, we appreciate this opportunity to provide you with our concerns and thoughts on how national objectives relative to safe drinking water can be better met through effective programs for quality research. In that regard, we also want to encourage the federal government to be receptive to, supportive of and, in fact, a proponent of collaborative efforts between the government and the water industry, as well as other interested parties, to pool resources to assure that sufficient funding is available for adequate research relative to drinking water regulations, which often involve very expensive requirements for water systems.

Introductory Comments

We will make three basic points in these comments:

- credible regulations that are effective in protecting public health and affordable for the people of this country must be based on sound, peer-reviewed science;
- health effects uncertainty surrounding pending revisions of the regulation for arsenic in drinking water requires a substantial investment in new research to assure that we meet the above objective;
- substantial research needs will require cooperative efforts among the federal and state governments, the regulated community and other interested parties to assure that adequate funding is available to accomplish the needed research on arsenic and other contaminants in drinking water. Experts have recommended a five-year (\$2 to \$5 million per year) research program with \$3 million for high priority initial research.

As an introductory note, we commend and support the general points made by both the U.S. Environmental Protection Agency (EPA) Office of Research and Development and the American Water Works Association (AWWA) in comments presented at the March 21 hearing, as noted below:

1. EPA's comments stressed the need to give "priority to research on significant national environmental concerns," emphasizing the need for looking at human health effects and ecological effects. EPA also specifically indicated a commitment to continue to conduct research to develop better understanding of the occurrence and health effects of water-borne bacteria, viruses and protozoa, and recognized the need to develop a better scientific basis for a standard for arsenic in drinking water.

2. AWWA's comments expressed strong support for an increased emphasis on the use of adequate and current health effects data in setting drinking water standards, recognizing that effective spending at that level is likely to result in billions of dollars of saving for the American consumer. AWWA's comments go on to make a strong case for the use of the best available good science and improved methodologies for estimating the risk posed by drinking water contaminants. AWWA endorsed the partnership approach for good science as illustrated by an American Water Works Association Research Foundation (AWWARF) proposal that calls for a dollar-for-dollar public-private funding approach for drinking water health effects research.

ACWA certainly agrees with these points made by EPA and AWWA, and we believe the following comments will generally corroborate and support their input.

Credible Regulations Require Sound, Peer-Reviewed Science

The above line seems almost axiomatic and, perhaps, a bit of a cliché. However, we have gone through what has often seemed regulation by speculation. If there was a hint of a threat of a health problem, even if not adequately and reasonably verified through sound scientific approaches and data, we have seen regulations promulgated "with a margin of safety" that require significant action by water systems at great public expense. Such action and such expense is essential when there is a real threat to public safety, but it is questionable at best when there is inadequate evidence to establish the threat.

We are a nation that is in financial trouble at the federal, state and local levels. Our infrastructure is in disastrous condition. We are faced with staggering investments just to maintain our place, let alone to catch up with growth already experienced and that is sure to be experienced as we move into the new century. We can no longer afford programs that cost the people of this country billions of dollars for questionable results. Regulation by speculation should be rejected as the national approach to dealing with drinking water, and there should be an insistence that regulations be based on sound data and a commitment to getting that data in a timely, comprehensive way before regulations are adopted.

A commitment to assuring good science as a base for regulations will require expenditure of significant amounts of money, but it should be viewed as a penny wise (but not pound foolish!) approach. Good research will cost millions of dollars, but it is likely to keep billions of dollars from being wasted, or, at the very least, will assure our citizens that their money is being well spent.

Therefore, ACWA urges Congress, in reauthorizing the Safe Drinking Water Act, to require that drinking water regulations be based on the best available, peer-reviewed science, and that where the U.S. Environmental Protection Agency, in consultation with the regulated community and other interested parties, determines that existing science is inadequate, that a research plan be developed and pursued to assure that adequate good science is available on which to base regulations.

Arsenic Health Effects Uncertainties Requires New Research

A revised regulation for arsenic in drinking water will be developed in the near future. The new regulation is likely to establish an arsenic maximum contaminant level (MCL) at a lower level than the current national interim drinking water regulation.

This may be necessary.

It may not be necessary.

No one knows.

Thus, arsenic is a good case study to illustrate why there needs to be an adequate national program of assuring sound, peer-reviewed science as the basis for its regulations. If we continue on the old regulation by speculation approach, the people of this country will spend billions of dollars on arsenic reduction. Yet there is no credible evidence that extreme low doses of arsenic pose a health threat.

We know there are levels at which arsenic, which occurs in both organic and inorganic forms, can be harmful to humans and other concentrations where it is thought to be an integral element in the human diet. For the most part, old studies conducted in Taiwan have been relied on for health effects data on arsenic. Those studies suggest that exposure to drinking water containing more than 100 parts per billion (ppb) of arsenic (more than twice the current regulatory limit) may be linked to greater incidence of some forms of cancer. There is no clear link, however, between very low levels of arsenic ingestion and cancer. The current MCL for arsenic in drinking water, established by EPA in 1975, is 50 ppb. In terms of relative quantities, this extremely small amount is comparable to 50 drops of water in an entire swimming pool or 50 people in all of China's one billion-plus population.

A great deal of concern has been expressed by scientists and those in the water community about the adequacy of the available science to support a more stringent arsenic standard. The concern revolves around the fact that much of the data relied on--primarily the Taiwan studies referenced above--is outdated and not pertinent to U.S. populations. Even EPA's own Science Advisory Board (SAB) has recommended that EPA clarify dose-response and pharmacokinetic relationships of arsenic in humans and give greater consideration to metabolism and detoxification mechanisms regarding arsenic. Specifically, the SAB has recommended that EPA carefully take into account the potential differences between Taiwanese and U.S. population before predicting a regulation based on the Taiwanese data. The differences include the different nutritional status of the two populations and, in particular, the high "background" blood levels of arsenic in the Taiwanese from outside the areas where excess cancers have been reported. Most importantly, SAB has questioned whether ingesting arsenic in water at concentrations lower than 100 ppb affects blood levels of arsenic at all!

The decisions that are ultimately made by Congress and the EPA on additional regulation of arsenic in drinking water potentially will have dramatic impact on the public. If the arsenic standard is lowered without a rational, scientific basis, billions of dollars of public money will be required to treat water to a level that may be below what is necessary. Removing low levels of arsenic from thousands and thousands of community drinking water wells and surface water sources would result in the following:

1. Diversion of scarce public funds from addressing real public health issues;
2. Adverse environmental impacts from cross-media pollution (sludge, energy, etc.); and
3. Additional costs of several billions of dollars to construct treatment facilities and millions more each year to operate them.

Recognizing the high level of concern about the inadequacy of scientific data on the health effects of arsenic in drinking water, ACWA, the American Water Works Association, the American Water Works Association Research Foundation and EPA in 1995 co-sponsored an intensive national workshop of scientific experts from around the country who assessed the adequacy of existing scientific data, identified the gaps in that data and the research needed to fill those gaps. The experts identified more than \$19 million of research that should be conducted to result in a full and comprehensive body of data. An initial high priority list of

research totaling \$3 million was deemed necessary as a starting point in developing a credible, reasonable regulation. The experts recommended that EPA, the water industry and other interested parties pursue a five-year research program (totaling \$2 million to \$5 million per year) to accomplish the complete research agenda defined by the workshop.

ACWA believes that accomplishing the identified research--at least a significant part of it--is essential to a credible, supportable arsenic regulation. Thus, we believe it important that the federal government appropriate money over the next five years specifically for the purpose of arsenic research. Additionally, we believe it reasonable to expect the regulated community, as well as other interested parties, also to provide funding for this purpose. It is through cooperative efforts that the significant funding necessary for adequate research can be secured. We believe this will be a good investment for the nation and its citizens.

Cooperative Efforts Are Essential To Adequate Research

Arsenic is a good case study, and it points us to the need for cooperative efforts to assure that future regulations developed under the federal Safe Drinking Water Act are based on sound, peer-reviewed science. In today's world, not even the federal government has the financial resources to keep up with all the funding demands it faces. Government, business and the American consumer share the common problem of trying to fund everything that requires attention. As new drinking water regulations are developed in the years ahead, costs that ultimately must be paid by the consumer are likely to sky rocket. Without improved science, we will be continuing the regulation by speculation syndrome, and that no longer is affordable. Thus, we believe arsenic should be viewed as the starting point of a new era in which regulations are based on knowledge derived from sound scientific data.

ACWA is a firm believer that the United States government, state governments, the water community and others interested in the regulation of drinking water should commit themselves to a new Partnership for Good Science. Following are components of such a partnership:

- an affirmative requirement that future regulations will be based on sound, peer-reviewed science;
- a commitment to assuring that scientific research necessary to provide that basis is identified and, if necessary, conducted;

- a commitment of federal funding for the purpose of financing such research;
- a commitment from the other interested parties, including the regulated community, to participate in that funding;
- a cooperative scheme for identifying needed research, developing a research plan, securing funding and managing the research agenda to get definitive results on which to base regulations.

The water community has already taken steps toward such a partnership. The federal government, too, has supported such cooperative approaches.

Following are examples of such collaborative efforts:

--the water industry, through the American Water Works Association Research Foundation (AWWARF), has established with EPA and other interested parties a Disinfectant/Disinfection By-Products Research Council that brings the parties from EPA's negotiated rulemaking together to identify, fund and manage the necessary research; AWWARF has agreed to match EPA commitments for this research dollar for dollar up to \$1 million a year (so far this year, that agreement will provide \$1.3 million for this research).

--ACWA and AWWARF are collaborating with EPA to create a science-based groundwater disinfection rule via research on "Field Study of Virus and Indicator Transport to Support the 'GWDR' Natural Disinfection Criteria."

--ACWA, AWWA and AWWARF, as well as EPA, have collaborated on the arsenic research needs workshop mentioned above to determine the resources needed for a science-based arsenic regulation.

We are very proud of the fact that California domestic water agencies have already stepped forward to provide significant funding for drinking water research.

Following are examples:

--250 California water agencies voluntarily invest in drinking water research and development each year via AWWARF's Research Subscription Program; in 1995, the investment of these 250 agencies totaled \$1,617,502.

--Investment of California water agencies in the subscription has grown more than six fold since 1986.

--California universities, water agencies and engineering firms have also

conducted well over \$10 million in peer-reviewed, competitively awarded research during that period.

During this time frame we have seen significant reductions in EPA funding of drinking water research. We are advised that since 1992 funding for EPA's extra-mural drinking water research and development program has declined from \$22.7 million to about \$5 million. Extra-mural research is the program within EPA which funds actual research projects. During this same period, EPA regulations increased nearly five fold!

As an industry, we were pleased to see legislation (S. 1316) clear the Senate that included \$25 million for drinking water research with \$4 million a year earmarked for arsenic research. That sort of funding level is consistent with the above discussion and provides a sound basis, as part of a broad Partnership for Good Science, for a comprehensive national drinking water research program. Like AWWA, we commend to you the proposal of the AWWARF that is the embodiment of a public/private or local/federal research partnership to stretch cooperatively the funding resources of the federal government, state governments, the regulated community and other interested parties to assure a comprehensive research base for drinking water regulations.

Thank you for this opportunity to provide input relative to your considerations concerning the reauthorization of the federal Safe Drinking Water Act.

Prepared Statement of Professor Neil E. Todreas
for the House Energy and Environment Subcommittee
of the Science Committee

PROPOSAL FOR FY97 BUDGET OF THE
DEPARTMENT OF ENERGY

UNIVERSITY RESEARCH REACTOR
CENTERS OF EXCELLENCE

(Short Statement of Objectives)

WHAT IS THE GOAL OF THIS PROPOSAL?

To establish a DOE-funded program for five to seven regional university centers for radiation science and technology education, each based around a university research reactor.

WHAT BENEFITS WILL RESULT FROM IMPLEMENTATION OF THIS PROPOSAL?

The URR Centers of Excellence will develop and operate programs of excellence in research and teaching focused on the applications of research reactors in the neutron sciences and technologies. This will allow existing investments in the URRs to be leveraged significantly to benefit the national needs for research and teaching in the neutron sciences and technologies.

WHAT ARE THE RESEARCH AND EDUCATION BENEFITS AS WELL AS THE POTENTIAL ACCOMPLISHMENTS TO BE UNIQUELY DERIVED FROM URRs?

The URRs can make a major impact on research and development in the neutron sciences and technologies, and also provide optimal facilities for the education of future scientists and engineers who are critical to sustaining the nation's technological base in a diverse spectrum of fields. Work at existing URRs is responsible for developing new radiopharmaceuticals for diagnosis and treatment of cancers, for providing structural information on new high-technology materials, for developing critical data on the behavior of metals, ceramics, polymers, and reactor coolants in radiation environments, and for providing critical data from neutron activation analysis to make advances in a variety of diverse fields (e.g., allowing archaeologists to map trade routes of prehistoric artifacts). Most of these areas of technology are uniquely in the domain of nuclear research reactors and cannot be duplicated on accelerator-based radiation sources. The facilities existing or that can be developed at URRs for the study of materials, trace element analysis, and for producing isotopes are complementary to those found at the National Laboratories, but are located in the highly creative and multidisciplinary environment of a university. In their role of providing graduate education and training for radiation scientists, URRs exploit these benefits of the university and provide educational advantages that are generally superior to those afforded by the national user facilities. This is the concept for "feeder research reactors" that has been highly successful in Europe and has been an important factor in propelling these countries into their present dominant leadership roles in the neutron sciences. With adequate support of URRs,

this model can also be implemented here and help ensure that the U.S. will fully benefit from the neutron sciences and technologies.

WHAT ARE THE PROGRAM FINANCIAL REQUIREMENTS?

\$8-to-10M annually in sustaining programmatic funding. These are new dollars beyond the historically provided and proposed funds for the entire university reactor population (see attachment).

\$25M initial (likely adequate for first 5-year period of Center program) for capital funding for preparing reactors for regional Center role (e.g., power upgrade, instrumentation, facility refurbishment).

HOW DOES THIS INITIATIVE RELATE TO EXISTING FEDERAL SUPPORT FOR URRs?

This proposal is for new funds to enhance the research and education productivity of five-to-seven of the existing 34 URRs. The remaining URRs will continue to provide nationally important facilities for training and introduction of the public to radiation sources and applications. Therefore, the existing funding for URRs for reactor fuel, access of regional institutions to these facilities (i.e., reactor sharing), and instrumentation is also needed. Historically this need, while acknowledged by existing DOE financial support, has been underfunded.

ARE THERE PREVIOUS SIGNIFICANT REPORTS ON THIS NEED?

Secretary O'Leary submitted a May 19, 1994 Report to Congress as required by the Energy Policy Act of 1992, based on data gathered in early 1993. The principal findings were:

- DOE considers university research reactors (URRs) to be an important national asset relative to nuclear science, technology, and manpower development.
- The total operating costs of all URRs are equivalent to the cost of operating one DOE research reactor.
- The 37 URRs considered in the study represent an initial investment of \$60M with a replacement costs of about \$1B today.
- Needs for upgrades identified in \$M were:

Power Range	Reactors	Operations	Utilization
Less than 1 MW	20	3.9	1.6
1 MW to 2 MW	13	5.3	7.9
Over 2 MW	3	5.5	56.2
	36*	\$14.7M	\$65.7M

* Currently there are 34 operating URRs.

The most comprehensive prior study was that by the National Research Council (NRC) in 1988, which concluded that the URRs serve the national interest in research, education and service. This study, which references other related studies, also concluded that these research reactors do not adequately fulfill the national interests in research and education related to the neutron sciences and technologies. These shortcomings are particularly apparent when comparing the U.S. to the foreign situation, especially in Europe and Japan. These

deficiencies stem in part from inadequacies in financial support for operating, upgrading and state-of-the-art research instrumentation.

WHY IS THIS INITIATIVE NEEDED NOW?

URRs constructed in the late 1950s and early 1960s and granted 40-year operating licenses are facing the decision of whether to relicense. University administrators who have been funding research reactor operations from university sources are increasingly reluctant to make the long term commitment to continue this support which a positive decision on license renewal entails because of the decreasing level of nuclear energy technology activity nationally. Concurrently, Nuclear Engineering Departments are increasing their emphasis on radiation science to stay viable, and their research reactors are thus becoming increasing vital facilities for anchoring their experimental research activity in nuclear science and engineering.

The closure of one or more flagship university reactors would trigger a re-evaluation of the commitment of many of the smaller reactors to stay operating. This could result in the loss nationally of significant capability for radiation science and engineering education.

HOW MUCH CONSENSUS EXISTS FOR THIS PROPOSAL?

This proposal was accelerated in the fall of 1995 by an industrial group gathered by MIT's president following a review of operations and relicensing potential for the MIT research reactor. This industrial group solicited the views of the URR community through the National Organization of Test, Research and Training Reactors.

The industrial group strongly favors this proposal as the vehicle to develop research of national scientific and technological benefit while simultaneously securing vital facilities for the training of students in the radiation sciences and applications. The university community is currently reviewing this proposal. The facilities that are heavily research oriented will generally endorse this proposal on the basis that a peer-reviewed center selection process is adopted and the need for funding for the non-center URRs is affirmed. The facilities that do not consider themselves candidates for center designation will likely not endorse this proposal believing that this proposal will capture a disproportional amount of the funds that will be made available to the entire URR community.

WHAT IS THE SCOPE OF THE CENTER PROPOSAL?

Several URR Centers of Excellence will be provided with resources needed to develop and operate world-class programs in research and teaching focused on the applications of research reactor in the neutron sciences and technologies. Financial support for reactor-based research and reactor operations will be made available to a total of five-to-seven URR Centers of Excellence. Total funds of \$8-to-10M will be available for this aspect of the program. Funds will also be available for reactor and major experimental equipment upgrades which will be needed to assure that the centers can effectively carry out their missions. A total of \$25M for these capital improvements will be available to the centers over a period of three-to-five years. Funding under this program will be provided on the basis of detailed proposals which will be submitted to rigorous peer review.

It is important that the funds for this Center concept be in addition to those historically and currently projected for the URR community. These funds (see attachment for history of URR support) are needed for those in the existing community of 34 URRs that will not benefit from the Center concept for reactor fuel, reactor sharing (with their regional institutions), and instrumentation. A budget of \$5-8M/yr is needed for this community for operations and capital to support safe, efficient operations.

WHAT ARE THE ELEMENTS/PRINCIPLES OF THE CENTER CONCEPT?

- Five-to-seven sites;
- \$8-to-10M/yr sustaining programmatic funds and \$25M capital improvement funds (these should be new funds) to be funded over a two-to-three year period;
- University reactors that do not successfully compete should receive reactor funding from existing University Research Reactor programs, which can conceivably achieve a \$8M/yr level over the next several years;
- Center support shall be awarded for a five-year period renewable subject to rebidding in a new competition; and
- A set of selection criteria for proposed Centers will be established, which will include:
 - the existing and proposed strength and breadth of the research programs and research equipment using the reactor,
 - the existing and proposed institutional support structure for research and education in the radiation sciences including the level of external grant support already in place, and
 - the cost-effectiveness of the research performance of the reactor.

WHICH GROUPS ARE SPONSORING THIS PROPOSAL?

This preliminary statement of the Center of Excellence concept is being developed into a final proposal with the encouragement and assistance of the following people:

<u>University Community</u>	<u>Industrial Advisory Group</u>
Prof. Neil Todreas, MIT, Chairman, Reactor Review Group	Mr. John Landis, Chairman of Advisory Group; retired Executive VP, Stone & Webster Engineering Corp.
Dr. Richard Holm, Executive Committee, TRTR*; Director, U.Ill. Research Reactor	Dr. E. Linn Draper, Member, Executive Committee, Board, NEI; President & COO, American Electric Power Co.
Dr. James Rhyne, Director, U.Missouri, Research Reactor Center	Dr. Robin Jones, VP Nuclear Power, Electric Power Research Institute
Dr. David Shirley, PennState, Sr. VP, Research & Graduate Education; Chairman, NAS 1988 URR Study	Mr. William Lee, retired Chairman & President, Duke Power Co.
Prof. Marcus Voth, Chairman, University Reactor Support Committee, TRTR; Director, PennState Radiation Science & Engineering Center	Dr. Lawrence T. Papay, MIT; VP and Manager, R&D, Bechtel Corp.
Prof. Bernard Wehring, Co-Chairman, TRTR; Director, Nuclear Engineering Teaching Lab, U.TX-Austin	Mr. Cordell Reed, VP, Commonwealth Edison Co.
	Dr. Steve Specker, VP Nuclear, General Electric Co.
	Dr. Bertram Wolfe, retired VP Nuclear, General Electric Co.
* National Organization of Test, Research & Training Reactors	Mr. Nathaniel Woodson, VP, Westinghouse Electric Corp.

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RESEARCH REACTORS AT U.S. UNIVERSITIES

(updated from 1988 National Research Council Study)

Owner	Designation	Power (Megawatts)	Notes
Missouri, University of (Columbia)	MURR	10	
Georgia Institute of Technology	GTRR	5	
Massachusetts Institute of Technology	MITR-II	4.9	
Michigan, University of	FNR	2	
Rhode Island Nuclear Science Center ^a	RINSC	2	
New York, State University at Buffalo	SUNY	2	Presently closed
Virginia, University of	UVAR	2	
Illinois, University of	UI-TRIGA	1.5	
Oregon State University	OSTR	1.1	
Lowell, University of	ULR	1	
North Carolina State University	PULSTAR	1	
Pennsylvania State University	PSBR	1	
Texas A&M University	NSCR	1	
Texas, University of (Austin)	UT-TRIGA	1	
Washington State University	WSUR	1	
Wisconsin, University of	UWNR	1	
			(Kilowatts)
California, University of (Irvine)	UCI-TRIGA	250	
Kansas State University	KSU-TRIGA	250	
Maryland, University of	MUTR	250	
Michigan State University	MiSU-TRIGA	250	Presently closed
Reed College	RRF	250	
Missouri, University of (Rolla)	UMRR	200	
Arizona, University of	UA-TRIGA	100	
Cornell University	Cor U-TRIGA	100	
Florida, University of	UFTR	100	
Utah, University of	Utah-TRIGA	100	
Washington, University of	UWNR	100	Presently closed
Iowa State University	ISU	10	
Worcester Polytechnic Institute	WPI	10	
Ohio State University	OSURR	10	Now 500 kW
Purdue University	PUR-1	1	
			(Watts)
Cornell University	ZPR	100	
Oklahoma, University of	AGN-211P	15	Presently closed
Idaho State University	AGN-201M	5	
New Mexico, University of	AGN-201M	5	
Texas A&M University	AGN-201M	5	
Utah, University of	AGN-201	5	Presently closed
Illinois, University of	UI-LOPRA	1	Presently closed
Manhattan College	MCZPR	0.1	
Rensselaer Polytechnic Institute	RPI	Critical	

^a State operated

SOURCE: Burn, 1983, 1987.

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